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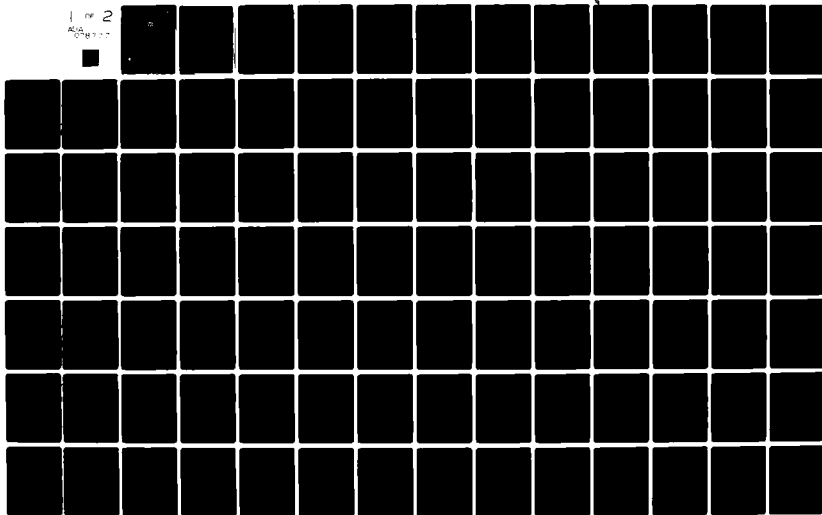
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PROPELLANT SURVEILLANCE REPORT LGM-30 F & G STAGE 1 PHASE E, SE--ETC(U)
OCT 79 J A THOMPSON
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HEADQUARTERS

OGDEN AIR LOGISTICS CENTER

UNITED STATES AIR FORCE

HILL AIR FORCE BASE, UTAH 84056

LEVEL

PROPELLANT

SURVEILLANCE REPORT
LGM-30 F&G STAGE 1
PHASE E, SERIES VIII
TP-H1011

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DEC 27 1979
E

PROPELLANT LABORATORY SECTION

MANCP REPORT

423(79)

OCTOBER 1979

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MMWRM PROJECT M82934C-WNL17514

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PROPELLANT SURVEILLANCE REPORT
LGM-30 F & G STAGE 1 (TP-H1011).

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Phase E, Series VIII

Author

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Semi-annual rept.

10

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ABSTRACT

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30 F and G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRM Project M82934C-WNL17514.

The data from this test period are combined with data from previous testing and entered into the G085 computer for storage, analysis and regression analysis. From the statistical analysis of all data tested to date (thirteen and one-half years for F and G), significant degradation of the propellant does not appear likely for at least two years past the oldest data point.

Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point is indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 system.

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29B	Zero Time Test Results	29 Jan 64
29C	Zero Time Test Results (Supplement 1)	30 Mar 64
29D	Zero Time Test Results (Aft Closure)	9 Jun 64
29E	Zero Time (Aft Closure Supplement 1)	24 Jun 64
29F	ATP Phase I Test Results	30 Mar 65
29G	ATP Phase I Test Results	19 Aug 65
29H	ATP Phase I Test Results	10 Sep 65
32A	Zero Time, Wings II-V Test Results	17 Mar 65
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55	ATP Phase I, Wings II-V (Third Group)	29 Apr 66
58	ATP Phase I, Wings II-V (Fourth Group)	6 May 66
61	ATP Phase I, Wings II-V (Fifth Group)	10 Jun 66
66	ATP Phase I, Wings II-V (Sixth Group)	22 Jul 66
76	ATP Phase II, Wing I Test Results	24 Jan 67
78	Zero Time, Wing VI Test Results	3 Feb 67
104	ATP Phase I, Wing VI (First Group)	12 Oct 67
118	ATP Phase II, Wings II-V (First Group)	5 Mar 68

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<u>Report Nr</u>	<u>Title</u>	<u>Report Date</u>
126	ATP Phase II, Wings II-V (Second Group)	11 Apr 68
130	ATP Phase II, Wings II-V (Third Group)	3 May 68
162	ATP Phase I, Wing VI (Second Group)	30 Sep 69
176	ATP Phase II, Wing VI (First Group)	15 Apr 70
181	ATP Phase III, Wing I	7 May 70
185	ATP Phase I, Wing VI (Third Group)	22 Jun 70
195	ATP Phase III, Wings II-V (Retest)	29 Oct 70
223	Surveillance Report LGM-30 Stage I (TP-H1011)	Sep 71
239	Surveillance Report LGM-30 Stage I (TP-H1011 and TP-H1043)	Apr 72
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280	Surveillance Report LGM-30 A & B Stage I (TP-H1011)	Nov 73
288	Propellant Surveillance Report LGM-30 A & B, Stage I, TP-H1043	Mar 74
290	Propellant Surveillance Report LGM-30 F & G, Stage I, Phase B, Series I TP-H1011	Mar 74
300	Minuteman Stage I Motor Reliability Improvement Program Surveillance	May 74

LIST OF REFERENCES (CONT)

<u>Report Nr</u>	<u>Title</u>	<u>Report Date</u>
302	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Nov 74
313	Stage 1 Propellant Surveillance Report, Propellant Containing Glacial Acrylic Acid	Oct 74
315	Propellant Surveillance Report LGM-30 F & G Stage 1, TP-H1011	Jan 75
316	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Feb 75
319	Propellant Surveillance Report LGM-30 Dissected Motors, Phase VI, TP-H1011	Apr 75
321	Propellant Surveillance Report LGM-30 F & G Stage 1, Phase B, Series II, TP-H1011	Apr 75
325	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Jun 75
328	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Sep 75
330	Propellant Surveillance Report LGM-30 F & G Stage 1, TP-H1011	Oct 75
335	Stage 1 Motor Reliability Improvement Program	Dec 75
337	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1043	Feb 76
339	Stage 1, New MAPO & ERL-510 Qualification	Mar 76
341	Propellant Surveillance Report LGM-30 Dissected Motors, Phase VII, TP-H1011	Mar 76

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343	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1011	Jun 76
345	Propellant Surveillance Report LGM-30 F & G, Stage 1 Phase B, Series III, TP-H1011	Jun 76
350	Qualification of a New MAPO Source and ERL-510 Curing Agent for Minuteman, Stage 1, UF-2121 Liner	Sep 76
351	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1011	Sep 76
354	Minuteman Stage 1 Motor Reliability Improvement Program Surveillance	Sep 76
358	Propellant Surveillance Report LGM-30 Dissected Motors, Phase VIII, TP-H1011	Oct 76
360	Propellant Surveillance Report LGM-30 F & G, Stage 1 Phase E, Series III, TP-H1011	Nov 76
367	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1011	Apr 77
370	Propellant Surveillance Report LGM-30 F & G, Stage 1, Phase E, Series II, TP-H1011	May 77
377	Qualification of a New MAPO Source and ERL-510 Curing Agent for Minuteman Stage 1, UF-2121 Liner	Oct 77
379	Final RIP Report, Minuteman Stage 1 Motor Reliability Improvement Program Surveillance	Oct 77
385	Propellant Surveillance Report LGM-30 A, B, F, & G, Stage 1, TP-H1043	Dec 77
388	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1011	Jan 78
390	Propellant Surveillance Report LGM-30 F & G Stage 1, Phase E, Series IV, TP-H1011	Feb 78
392	Propellant Surveillance Report LGM-30 Dissected Motors, Phase IX, TP-H1011	Mar 78

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<u>Report Nr</u>	<u>Title</u>	<u>Report Date</u>
396	Propellant Surveillance Report LGM-30 F & G Stage I, TP-H1011	Jun 78
405	Propellant Surveillance Report LGM-30 F & G Stage I, TP-H1011	Oct 78
406	Propellant Surveillance Report LGM-30 Dissected Motors, Phase X, TP-H1011	Nov 78
416	Propellant Surveillance Report LGM-30 F & G Stage I, TP-H1011	Apr 79

GLOSSARY OF TERMS AND ABBREVIATIONS

Aging Trend	A change in properties or performance resulting from aging of material or component
CSA	Cross Sectional Area
DB	Dogbone
Degradation	Gradual deterioration of properties or performance
E	Modulus (psi), defined as stress divided by strain along the initial linear portion of the curve.
EB	End Bonded
EGL	Effective Gage Length
em	Strain at maximum stress
er	Strain at rupture
"F" ratio	The ratio of the variance accounted for by the regression function to the random unexplained variance. The regression function having the most significant "F" ratio is used for plotting data. The ratio is also used in detecting significant changes in random variation between succeeding time points
JANNAF	Joint Army, Navy, NASA, Air Force Committee
MANCP	Propellant Lab Section at Ogden Air Logistics Center
Ogden ALC	Ogden Air Logistics Center, Air Force Logistics Command
r or R	The Correlation Coefficient is a measure of the degree of closeness of the linear relationship between two variables
Linear Regression Equation	The general form of the linear regression equation is $Y = a + bx$
Regression Line	Line representing mean test values with respect to time
S_b	Standard error of estimate of the regression coefficient

GLOSSARY OF TERMS AND ABBREVIATIONS (cont)

S_e or $S_{y.X}$	Standard deviation of the data about the regression line
S_m	Maximum Stress
S_r	Stress at rupture
Standard Deviation (S_y)	Square root of variance
Strain Rate	Crosshead speed divided by the EGL
"t" test	A statistical test used to detect significant differences between a measured parameter and an expected value of the parameter (determines if regression slope differs from zero at the 95% confidence level)
Variance	The sum of squares of deviations of the test results from the mean of the series after division by one less than the total number of test results
3 Sigma Band	The area between the upper and lower 3 sigma limit. It can be expected that 99.73% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed.
90-90 Band	It can be stated with 90% confidence that 90% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed
Significant	As used in the statistical sense, means a difference unlikely to have been the result of random sampling from some specified population.

INTRODUCTION

A. PURPOSE:

Laboratory testing has been performed for thirteen and one-half years on First Stage LGM-30 F and G Minuteman Motor propellant blocks to evaluate the effects of aging on TP-H1011 propellant. This report contains those tests conducted on propellant as instructed in MMWRM Test Directive GTD-1C, Amendment 2, LGM-30 First Stage Operational Propellant Laboratory Testing.

Statistical analysis of the data from tests performed will provide early warning if serious degradation trends develop. Annual evaluation of the propellant provides data for input into engineering reliability analysis for service life predictions.

B. BACKGROUND:

LGM-30 F and G testing was started in 1966 with phase testing at 24 month intervals (Report Numbers 78 - zero time; 104, 162, 185-Phase I: 176, 239, 257-Phase II; 271-Phase III). Report Number 257 was the first time that LGM-30 F and G data were statistically analyzed separately from LGM-30A and B data. The present report is a continuation of testing and statistical analysis.

Zero time testing for LGM-30A, B, F and G was started as soon as possible after receipt of the propellant by MANCP. Data from these tests were used to establish a base line for each test parameter.

The LGM-30F and G propellant test matrix (Table 1) is used to determine the number of specimens to be taken from each propellant loaf and the specific test or tests to which these specimens are to be subjected. Very low rate and low rate tensile specimens are taken on all LGM-30F and G blocks. Specimens for other physical and combustion tests are taken from every third (LGM-30F and G) block.

TABLE 1

SAMPLE PLAN

The Procedure for determining tests to be performed on propellant batch samples of IGM-30 F & G First Stage Motors are as follows:

1. Divide the USAF motor serial numbers into three groups by dividing the last three digits of each serial number by three to determine the remainder integer, e.g., $154 \div 3 = 51$ with a remainder integer of 1.
2. Use the remainder integer to enter the following matrix to determine the group of tests to be performed on the forward, middle, and aft batch samples associated with a particular motor serial number.

GROUP MATRIX			
TP-H1011 PROPELLANT BATCH SAMPLE	GROUP I	GROUP II	GROUP III
Forward	1	2	0
Middle	0	1	2
Aft	2	0	1

Each group will receive the following tests:

TEST MATRIX			
GROUP I	GROUP II	GROUP III	
High Rate Triaxial	Dynamic Response	High Rate Hydrostatic	
Creep	Stress Relaxation	Sol Gel	
Biaxial Low Rate	Burning Rate	DSC	
TGIE	Heat of Explosion	TGA	
Hardness	Pressure Time	DTA	
Ignitability		Impact	

NOTE: Low Rate and Very Low Rate Tensile tests are performed on all blocks.

STATISTICAL APPROACH

In order to determine aging trends for shelf/service life predictions, as directed by Service Engineering, First Stage LGM-30 F and G Minuteman TP-H1011 propellant blocks have been undergoing testing since 1966, statistically analyzed and reported on a regular test cycle by this laboratory.

The primary reason for performing statistical analysis on test data is for the detection of propellant changes due to aging that would affect motor reliability. Regression analysis was the method used to examine data and to aid in drawing conclusions about dependency relationships that may exist i.e., relationship between age versus test results.

In selecting the best fit model for the regression equation, the linear model $Y = a + bX$ was found to be the best fit model for the regression plots.

Individual data points from different time periods were used to establish a least squares trend line for the data. The variance about the regression line, obtained using individual values of the dependent variable, was used to compute a tolerance interval such that at the 90% confidence level 90% of the sample distribution falls within this interval. This tolerance interval was extrapolated to a maximum of 24 months into the future from age of the oldest motor tested. The 't' value and the significance of this statistic, which are reported for each regression model, give an indication of the "statistical significance" of the slope of the trend line as compared to a line of zero slope. When a regression slope is indicated to be significant, it should be noted that the slope of the regression line is significant from a statistical standpoint and it is an indication that a change over time is occurring, but does not necessarily mean that the indicated change in the

value obtained during testing is significant in regards to motor operational performance. In a few cases, this small change has become the apparent trend in data variance and regression line trends. However, the changes are gradual and no operational problems are expected at this time.

The data were plotted by computer. The 'y' axis is computed so that the values at one inch intervals are peculiar to the data spread of the parameter tested. Plotted data points represent means at the particular ages at which testing occurred. The number of specimens at each age point is indicated on the sample size summary sheet accompanying the regression plot. Variance at each test age can be determined by consulting the G085 data storage system.

TEST RESULTS

VERY LOW RATE TENSILE:

Very low rate regressions show no significant change for strain at maximum stress with strain at rupture showing a statistically significant decrease. The stresses and modulus show a statistically significant increase (Figures 1 thru 5). The trends are gradual for the respective regressions and no operational problems from the propellant are expected for at least two years beyond the last test date.

LOW RATE BIAXIAL TENSILE:

The strain regressions show a statistically significant gradual decrease. The stresses and modulus show a statistically significant increase (Figures 6 thru 10).

LOW RATE TENSILE:

Low rate tensile data regressions show a statistically significant gradual decrease for strains and a statistically significant increase for stresses and modulus (Figures 11 thru 15).

HIGH RATE TRIAXIAL TENSILE:

The strain at maximum stress, strain at rupture and modulus regressions show a statistically significant decrease. Maximum stress shows a statistically significant increase. Stress at rupture does not show a significant change (Figures 16 thru 20).

HIGH RATE HYDROSTATIC TENSILE:

The strains show a statistically significant decrease. The stresses and modulus show a statistically significant increase. (Figures 21 thru 25).

TENSILE SUMMARY:

The test data regressions show that the strain is gradually decreasing and the stress and modulus gradually increasing.

Based on the analysis of test data regressions, it does not appear that meaningful degradation is occurring at this time and no operational problems are expected in the propellant for at least two years beyond the last data point.

STRESS RELAXATION MODULUS:

For the 0.5% strain at -65°F , the regressions for data at 10, 50, 100, and 1000 seconds show a statistically significant gradual increase. (Figures 26 thru 29).

At -40°F , the 10 and 50 second regressions show a statistically significant increase. The 100 and 1000 second regressions show no statistically significant changes. (Figures 30 thru 33).

The 3% strain regressions at 20°F , 77°F , 100°F , 140°F , and 180°F show a statistically significant gradual increase. (Figures 34 thru 53).

SOL GEL:

The percent extractables and density do not show a significant change. Gel swell ratio and crosslink density regressions show a statistically significant increase (Figures 54 thru 57).

CONSTANT STRAIN:

A statistically significant gradual decrease is shown for constant strain (Figure 58).

HARDNESS:

Shore A hardness increases and shows a statistically significant increase (Figure 59).

SUMMARY OF SOL GEL, TENSILE AND HARDNESS DATA:

The crosslink density, constant strain and hardness data regressions correlate with the tensile data. As the polymer continues to crosslink, the strains decrease and the stresses increase.

PRESSURE TIME:

Maximum pressure shows no significant change while time to maximum pressure shows a statistically significant gradual decrease (Figures 60 and 61).

TCLE (Thermal Coefficient of Linear Expansion):

The thermal coefficient of linear expansion for both above and below the glass transition point (T_g) shows a statistically significant gradual increase (Figures 62 and 63).

TGA (Thermal Gravimetric Analysis):

A statistically significant increase is shown for the ignition temperature (9°C rise/min), the percent weight loss at 250°C hold (12°C rise/min to hold) and the weight loss at ignition (Figures 64 thru 66).

DTA (Differential Thermal Analysis):

The endotherm and first and second exotherms show a statistically significant decrease. The third exotherm shows a statistically significant increase and the ignition temperature with no significant change (Figures 67 thru 71).

BURNING RATE:

The burning rate shows a statistically significant gradual increase (Figure 72).

DIFFERENTIAL SCANNING CALORIMETER:

The endotherm and second exotherm show a statistically significant decrease with the first exotherm showing no statistically significant change (Figures 73 thru 75).

THERMAL AND COMBUSTION SUMMARY:

The time to maximum pressure from the pressure time data and burning rate data show a correlation. In both cases, the regressions show a gradual increase in rate of reaction. The maximum pressure and DSC regressions also correlate well with each other. In both cases, a gradual decrease in energy is shown.

The ignition temperatures for TGA shows a gradual increase.

From the analyses of the regressions, no combustion problems are expected for at least two years beyond the oldest data point.

CONCLUSIONS

Thirteen and one-half years of aging at ambient temperature (77°F) has not greatly changed the properties of the propellant. Some test parameters indicate slight aging trends, but nothing that would adversely affect the operational characteristics of the rocket motor propellant.

From the statistical analysis, it does not appear that significant propellant degradation is occurring. Based on thirteen and one-half years of accumulated data, there is no reason to suspect that properties will show much change for at least two years past the last data point. Therefore, propellant reliability should not change appreciably over that time period. Since failure limits are not available for the parameters tested, this statement is based on the fact that the slope of the regression curves where statistically significant are, with few exceptions, relatively flat or close to the line of zero slope and have not changed appreciably from the last test period.

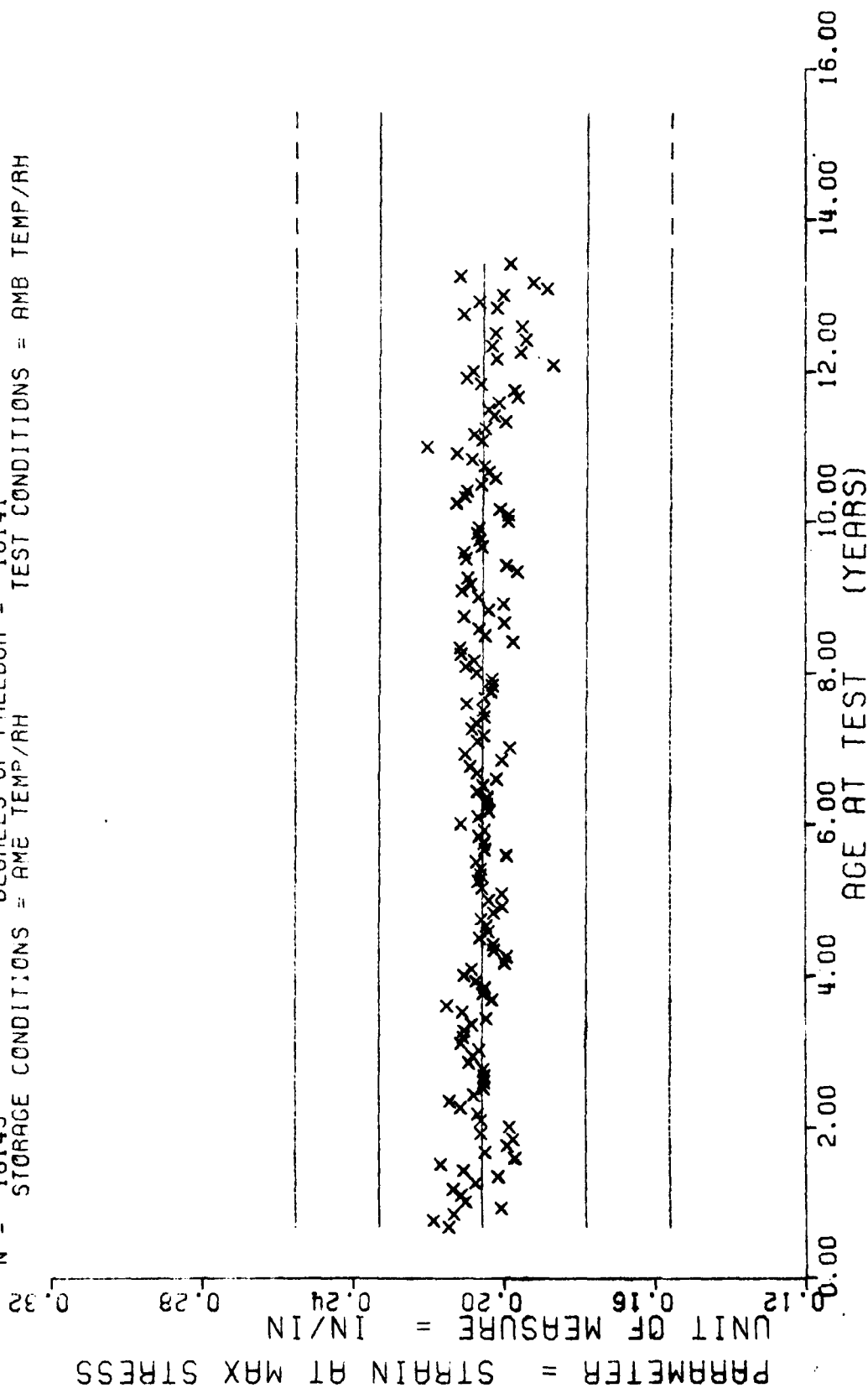
*** SAMPLE SIZE SUMMARY ***

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
9	5	33	152	58	352	83	108	133	79
9	19	34	154	59	305	56	109	134	106
10	11	35	113	60	496	76	110	135	60
11	15	36	226	61	276	32	111	136	91
12	30	37	147	62	325	122	112	137	90
13	46	38	126	63	249	139	113	138	255
14	28	39	119	64	157	177	114	139	151
15	58	40	122	65	106	144	115	140	69
16	45	41	156	66	79	191	116	141	34
17	55	42	123	67	42	79	117	142	36
18	28	43	142	68	173	198	118	143	188
19	49	44	106	69	225	90	119	144	86
20	24	45	135	70	284	140	120	145	3
21	56	46	122	71	132	185	121	146	18
22	27	47	166	72	118	141	122	147	13
23	67	48	177	73	95	150	123	148	37
24	55	49	199	74	140	182	124	149	12
25	83	50	188	75	177	154	125	150	21
26	47	51	347	76	135	130	126	151	36
27	50	52	314	77	161	51	127	153	5
28	56	53	295	78	91	65	128	154	15
29	40	54	232	79	117	75	129	155	15
30	73	55	474	80	113	27	130	156	9
31	88	56	461	81	155	11	131	157	9
32	153	57	392	82	176	28	132	158	6
								159	9
								161	9

WING 6.V.L.R.TENSILE-STRAIN AT MAX STRESS.CHS=0.002 IN/MIN TP-H1011

This sample size summary is applicable to figures 1 thru 3.

$Y = ((+2.0572913E-01) + (-4.6394204E-06) * X)$
 $F = +1.6799836E+00$ SIGNIFICANCE OF F = NOT SIGNIFICANT $G_r = +1.6542718E-02$
 $R = -9.6228249E-03$ SIGNIFICANCE OF R = NOT SIGNIFICANT $S_a = +3.5794016E-06$
 $t = +1.2961441E+00$ SIGNIFICANCE OF t = NOT SIGNIFICANT $S_e = +1.6542408E-02$
 $N = 18143$ DEGREES OF FREEDOM = 18141
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



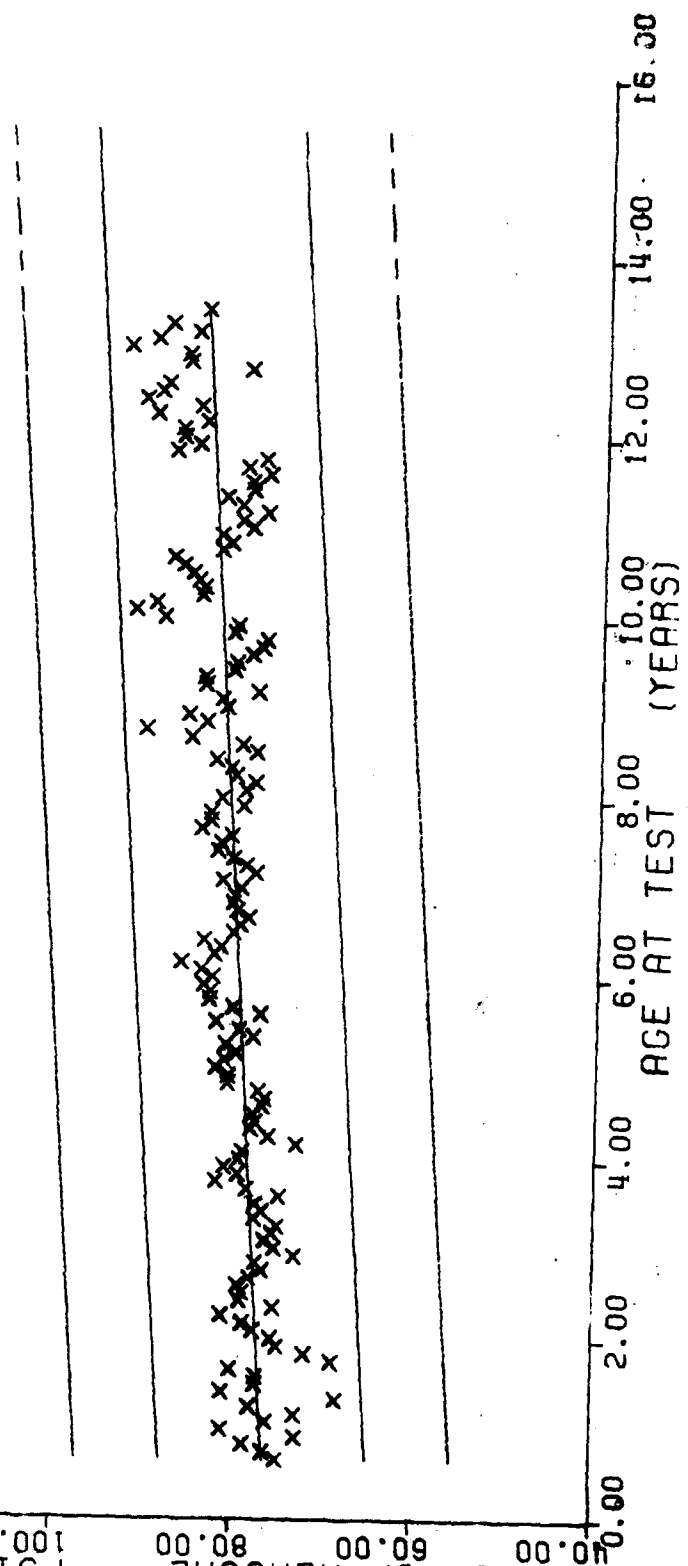
WING 6, V.L.R. TENSILE, STRAIN AT MAX STRESS, CHS=0.002 IN/MIN TP-H1011

Figure 1

PARAMETER = MAXIMUM STRESS

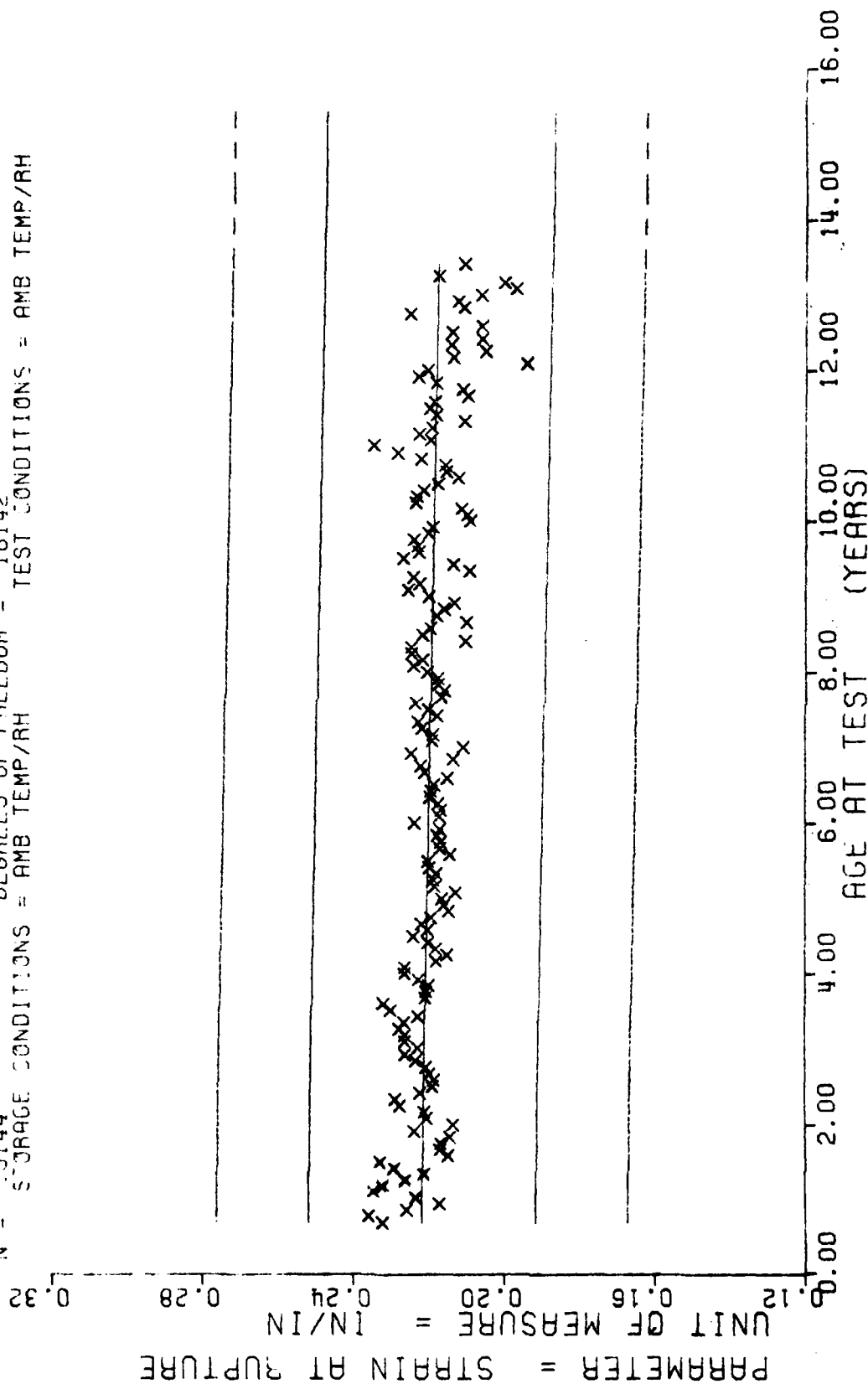
F = +1.2956320E+03
 R = +2.5817795E-01
 t = +3.5994888E+01
 N = 18144
 STORAGE CONDITIONS = AMB TEMP/RH
 DEGREES OF FREEDOM = 18142
 Y = ((+7.5926403E+01) + (+5.4051640E-02) * X)
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 S_t = +7.1835107E+03
 S_b = +1.5016476E-03
 S_e = +6.9401621E+03
 TEST CONDITIONS = AMB TEMP/RH

UNIT OF MEASURE = PSI



WING 6, V.L.R. TENSILE, MAXIMUM STRESS, CHS=0.002 IN/MIN TP-H1011

$Y = ((+2.2201304E-01) + (-2.8955103E-05) * X)$
 $F = +5.4211634E+01$ SIGNIFICANCE OF F = SIGNIFICANT $G = +1.8201888E-02$
 $R = -5.4582794E-02$ SIGNIFICANCE OF R = SIGNIFICANT $S_0 = +3.9325917E-06$
 $t = +7.3628550E+00$ SIGNIFICANCE OF t = SIGNIFICANT $S_e = +1.8175254E-02$
 $N = 18142$ DEGREES OF FREEDOM = 18142
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, V.L.R. TENSILE, STRAIN AT RUPTURE, CHS=0.002 IN/MIN TP-H1011

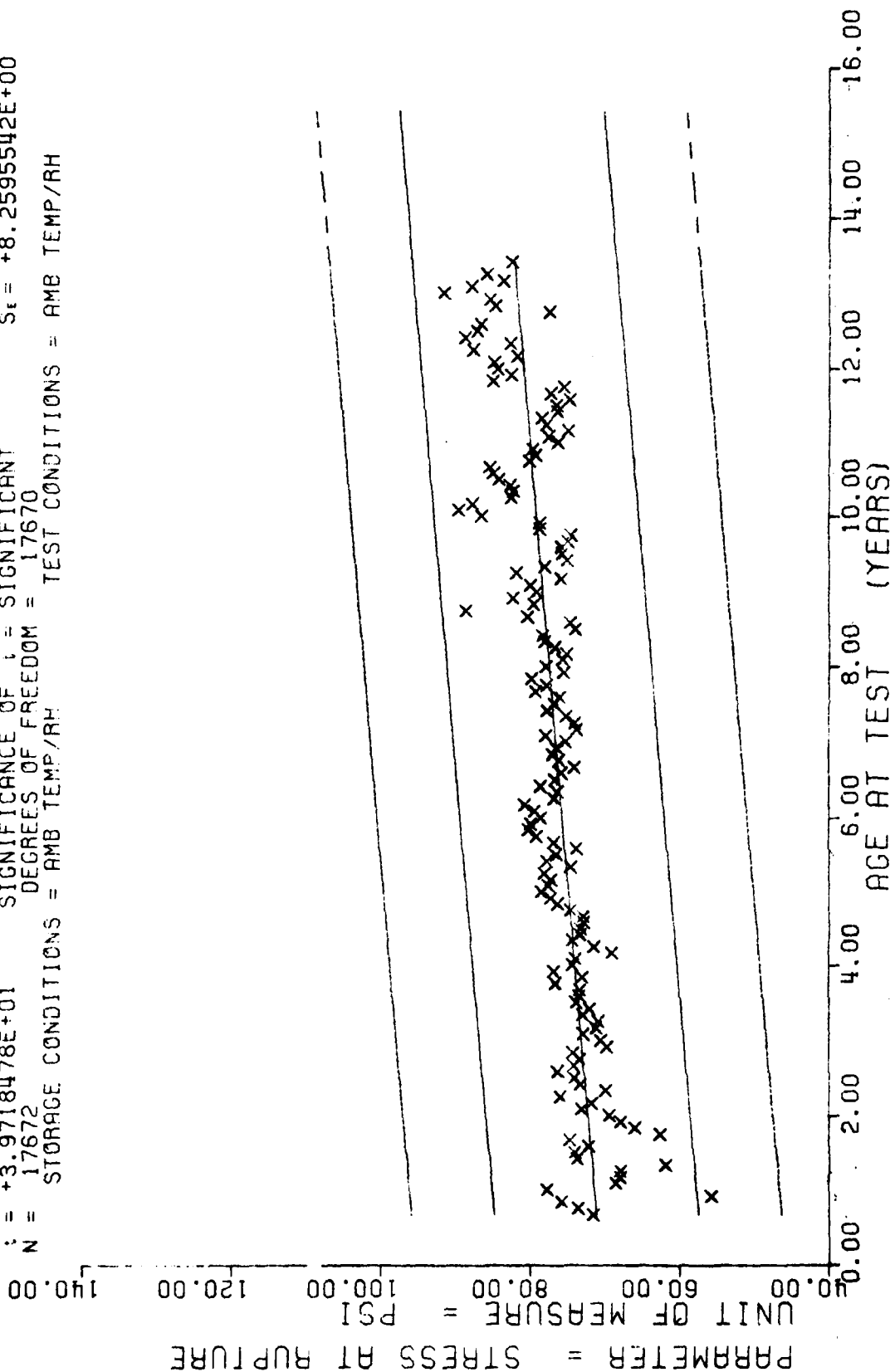
Figure 3

[illegible]

WING 6.V.L.R.TENSILE,STRESS AT RUPTURE,CHS=3.002 IN/MIN TP-H1011

This sample size summary is applicable to figure 4

$Y = ((+7.0550416E+01) + (+7.1533241E-02) * X)$
 $F = +1.5775575E+03$ SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +8.6201309E+00$
 $R = +2.8628908E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_a = +1.8010065E-03$
 $t = +3.9718478E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_t = +8.2595542E+00$
 $N = 17672$ DEGREES OF FREEDOM = 17670
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, V.L.R. TENSILE STRESS AT RUPTURE, CHS=0.002 IN/MIN TP-H1011

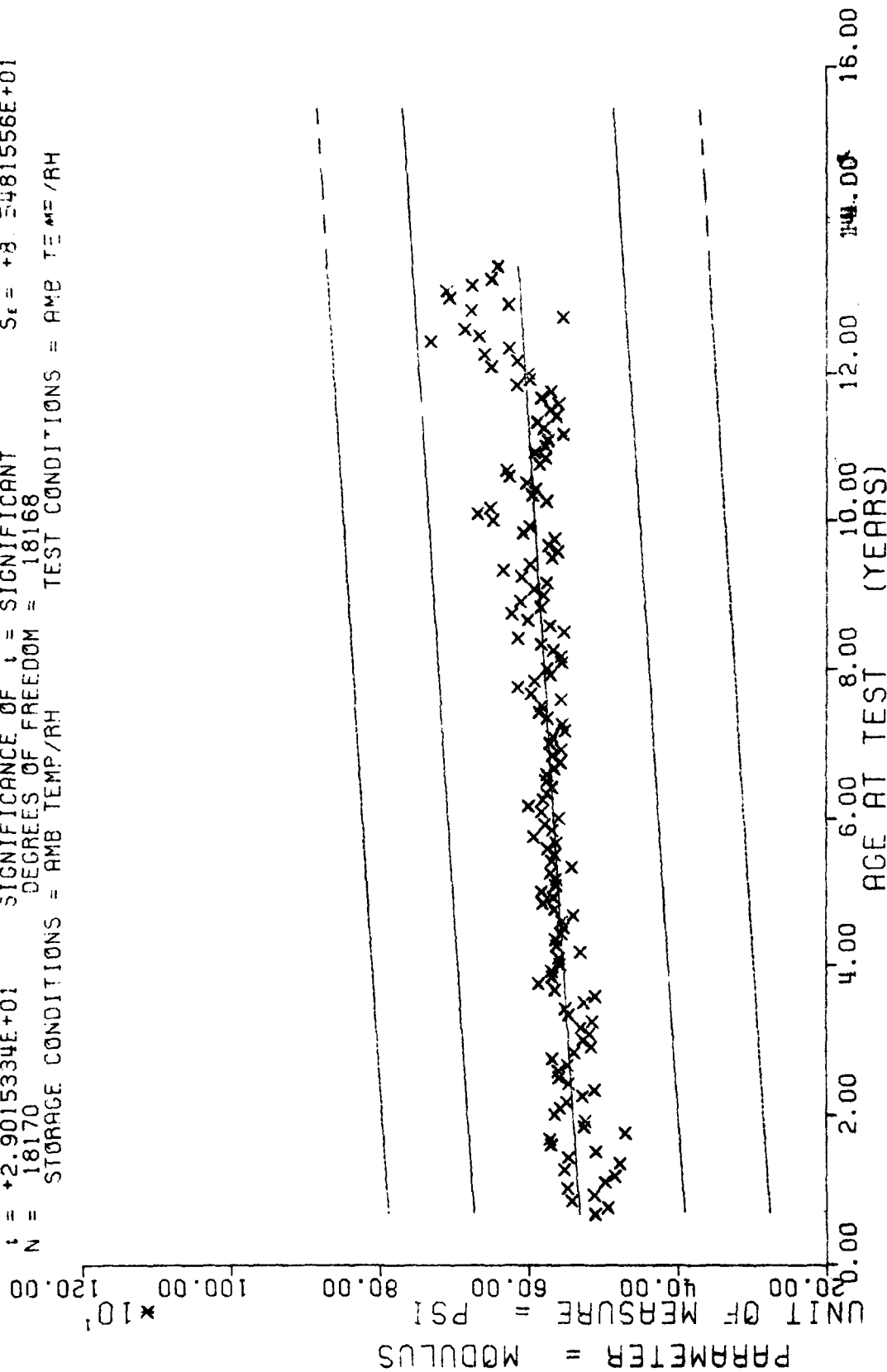
Figure 4

[illegible]

FWING 6,V.L.R.TENSILE,MODULUS,CH5=0.002 IN/MIN TP-H1011

This sample size summary is applicable to figure 5

$Y = (+5.2731788E+02) + (+5.3727054E-01) * X$
 F = +8.4188960E+02 SIGNIFICANCE OF F = SIGNIFICANT $G = +8.7437293E+01$
 R = +2.1044459E-01 SIGNIFICANCE OF R = SIGNIFICANT $S_b = +1.2516779E-02$
 t = +2.9015334E+01 SIGNIFICANCE OF t = SIGNIFICANT $S_c = +8.5481556E+01$
 N = 18170 DEGREES OF FREEDOM = 18168
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, V.L.R. TENSILE, MODULUS, CHS=0.002 IN/MIN TP-H1011

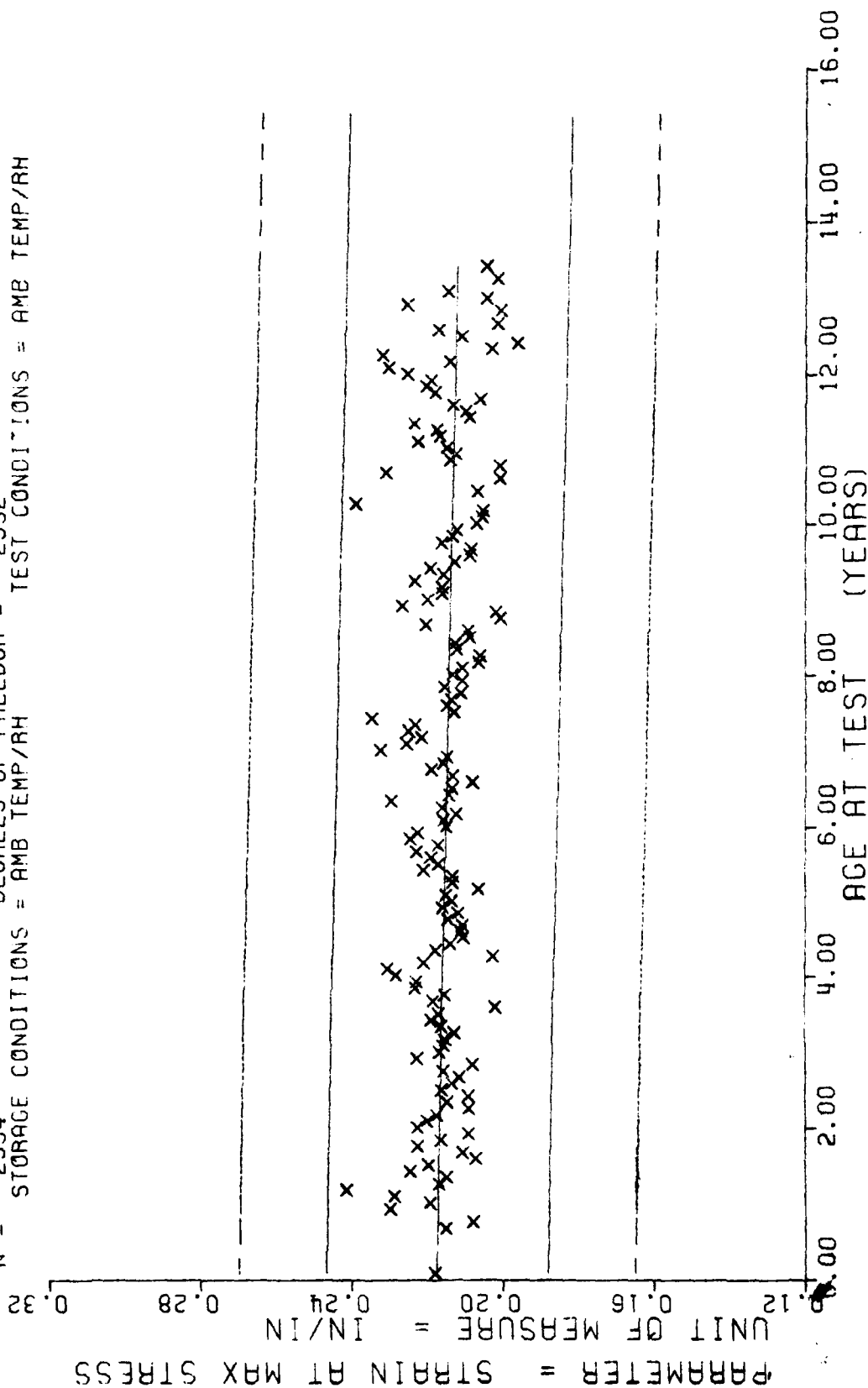
Figure 5

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
1	1	33	22	58	40	83	16	108	12
3	2	34	26	59	20	84	14	109	22
9	4	35	26	60	37	85	6	110	25
11	6	36	34	61	20	86	7	111	10
12	14	37	14	62	50	87	9	112	8
13	22	38	11	63	52	88	11	113	13
14	4	39	28	64	40	89	8	114	6
15	16	40	16	65	15	90	6	115	8
16	12	41	14	66	27	91	11	116	6
17	14	42	8	67	30	92	10	117	20
18	15	43	2	68	36	93	14	118	39
19	14	44	5	69	34	94	14	119	2
20	16	45	4	70	43	95	27	120	8
21	12	46	10	71	17	96	26	121	2
22	10	47	16	72	10	97	30	122	2
23	13	48	24	73	18	98	35	123	6
24	10	49	34	74	24	99	48	124	6
25	25	50	24	75	20	100	38	125	4
26	22	51	34	76	35	101	18	126	4
27	24	52	49	77	14	102	12	127	2
28	28	53	41	78	19	103	8	128	2
29	23	54	20	79	22	104	3	129	4
30	26	55	32	80	20	105	12	130	2
31	26	56	36	81	17	106	2	131	4
32	42	57	40	82	17	107	6	132	2
					29		108	133	2
					24		109	134	19

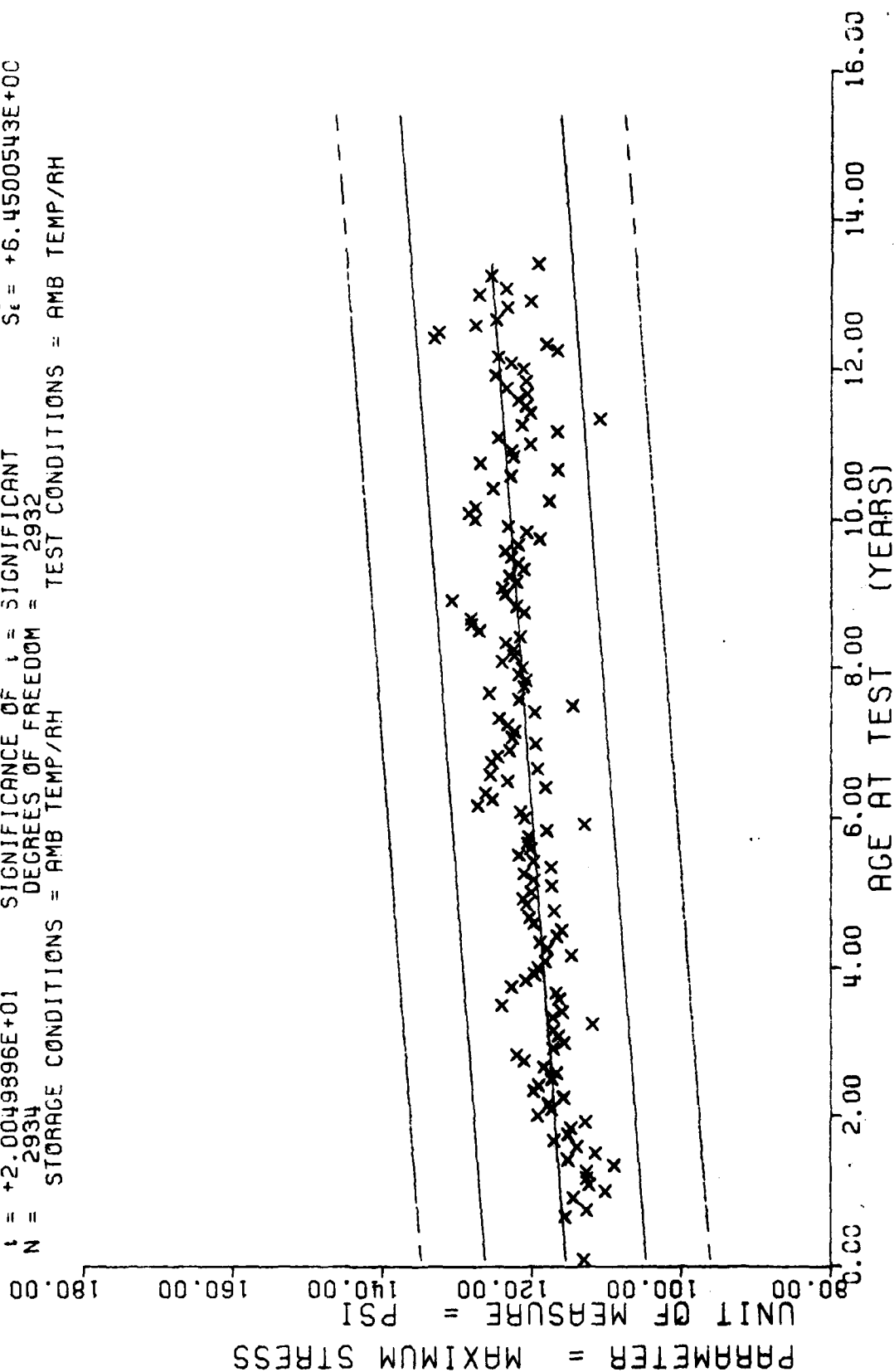
WING 6.L.R.EIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=0.2 IN/MIN TPH-1011

This sample size summary is applicable to figures 6 thru 10

$Y = ((+2.1753499E-01) + (-3.4309644E-05) * A)$
 $F = +1.6357678E+01$ SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +1.7529614E-02$
 $R = -7.4485331E-02$ SIGNIFICANCE OF R = SIGNIFICANT $S_0 = +8.4831154E-06$
 $t = +4.0444627E+00$ SIGNIFICANCE OF t = SIGNIFICANT $S_E = +1.7484099E-02$
 $N = 2934$ DEGREES OF FREEDOM = 2932
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

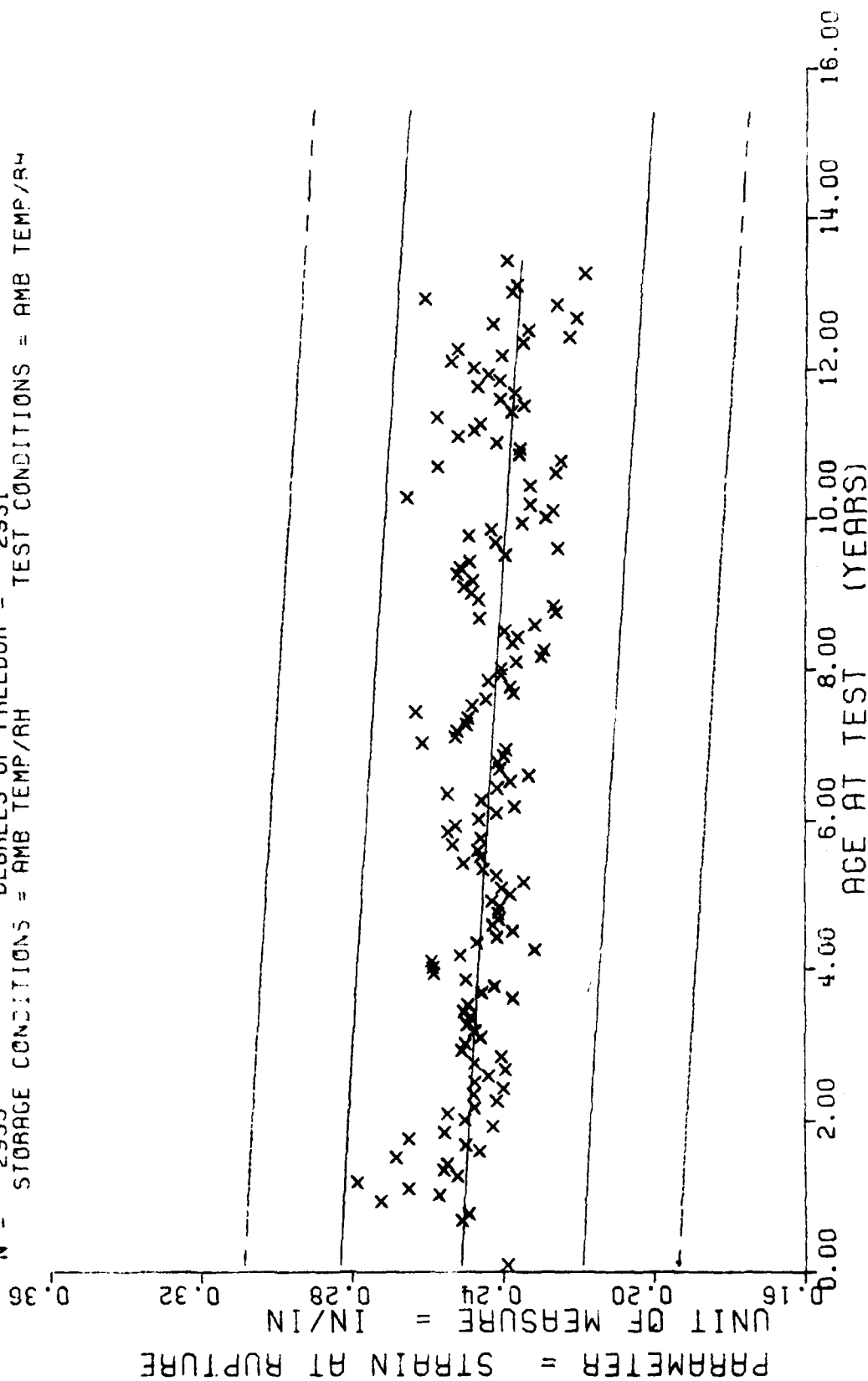


$F = +4.0199834E+02$
 $R = +3.4723975E-01$
 $t = +2.0049896E+01$
 $N = 2934$
 $Y = ((+1.1540090E+02) + (+6.2746225E-02) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 2932
 STORAGE CONDITIONS = AMB TEMP/RH
 TEST CONDITIONS = AMB TEMP/RH



WING 6, L.R. BIAxIAL TENSILE, MAXIMUM STRESS, CHS=0.2 IN/MIN TPH-1011

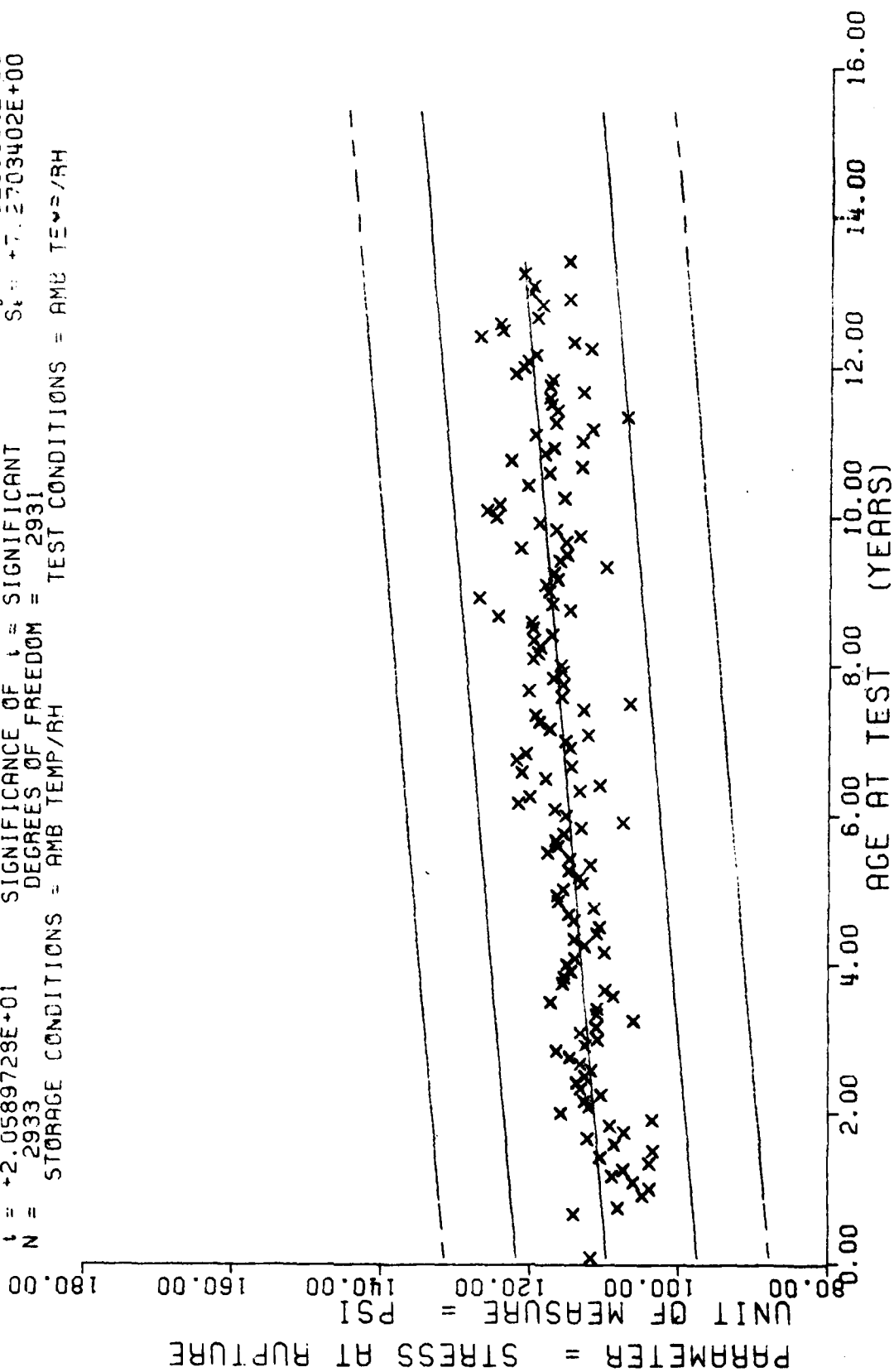
$\chi^2 = 1.1419696E+22$
 $R = -1.9365092E-01$
 $t = +1.0686297E-01$
 $N = 2933$
 STORAGE CONDITIONS = AMB TEMP/RH
 DEGREES OF FREEDOM = 2931
 TEST CONDITIONS = AMB TEMP/RH
 $\chi^2 = 1.9544321E-02$
 $R = +9.3067248E-06$
 $t = +1.9173118E-02$



WING 6, L.R. BIAxIAL TENSILE, STRAIN AT RUPTURE, CHS=0.2 IN/MIN TPH-1011

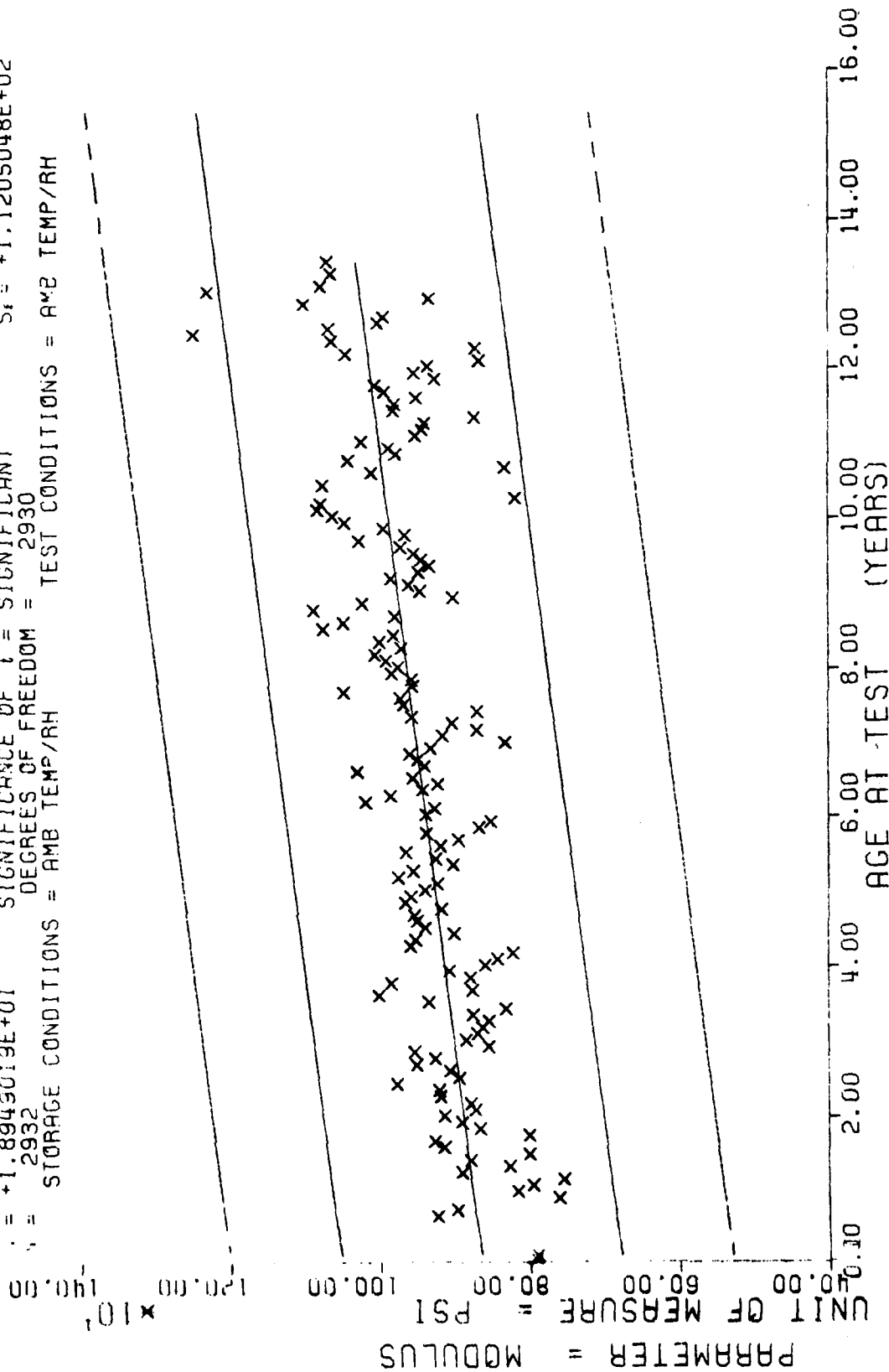
Figure 8

$F = +4.2393693E+02$ SIGNIFICANCE OF $F =$ SIGNIFICANT $G = +7.770507E+00$
 $R = +3.5547449E-01$ SIGNIFICANCE OF $R =$ SIGNIFICANT $S_a = +3.2281384E-03$
 $t = +2.0589728E+01$ SIGNIFICANCE OF $t =$ SIGNIFICANT $S_b = +7.2703402E+00$
 $N = 2933$ DEGREES OF FREEDOM = 2931
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, L. R. BIAXIAL TENSILE, STRESS AT RUPTURE, CHS=0.2 IN/MIN TPH-1011

$Y = ((+8.6350078E+02) + (+1.0510472E+00) \times X)$
 = +3.5905534E+02 SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +1.1869763E+02$
 = +3.3040795E-01 SIGNIFICANCE OF R = SIGNIFICANT $S_2 = +5.4411642E-02$
 = +1.8949019E+01 SIGNIFICANCE OF t = SIGNIFICANT $S_3 = +1.1205048E+02$
 = 2932 DEGREES OF FREEDOM = 2930
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



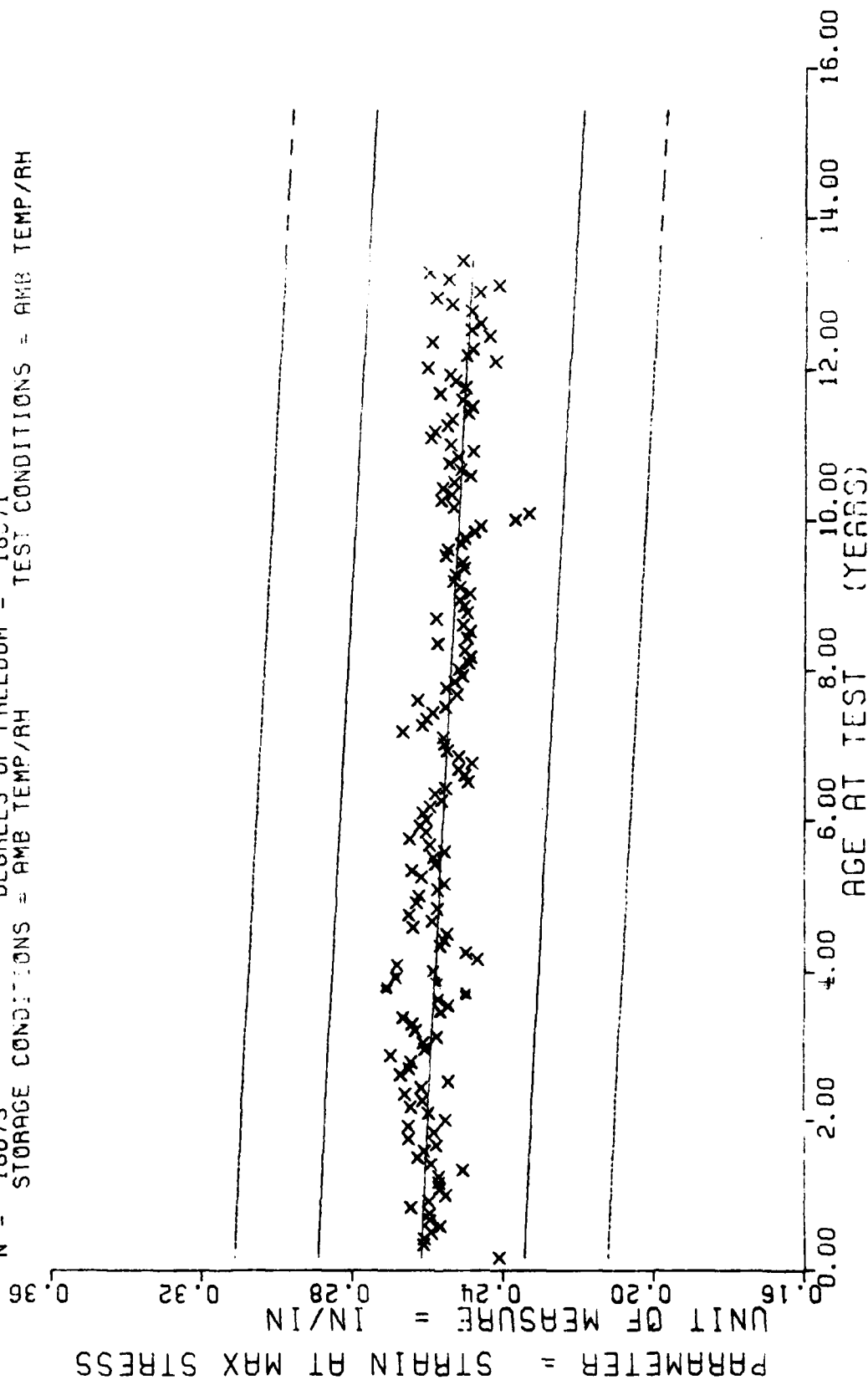
AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
2	3	28	82	53	97	78	177	103	53	128	74
4	37	29	55	54	84	79	123	104	72	129	51
5	154	30	52	55	143	80	132	105	12	130	261
6	191	31	52	55	108	81	179	106	12	131	132
7	171	32	124	57	172	82	94	107	27	132	55
8	143	33	35	58	158	83	100	108	105	133	61
9	194	34	78	59	122	84	75	109	106	134	99
10	189	35	44	60	144	85	83	110	56	135	44
11	192	36	154	61	171	86	60	111	30	136	45
12	220	37	83	62	212	87	153	112	75	137	84
13	213	38	35	63	289	88	143	113	114	138	267
14	222	39	93	64	131	89	150	114	73	139	153
15	223	40	65	65	75	90	102	115	74	140	34
16	212	41	35	66	58	91	82	116	264	141	35
17	104	42	69	67	101	92	80	117	261	142	75
18	26	43	75	68	110	93	81	118	161	143	214
19	60	44	21	69	154	94	122	119	117	144	18
20	18	45	20	70	188	95	130	120	253	145	9
21	78	46	58	71	102	96	228	121	109	146	39
22	43	47	106	72	145	97	230	122	35	147	12
23	30	48	85	73	153	98	209	123	40	148	15
24	77	49	122	74	172	99	141	124	42	149	20
25	51	50	108	75	241	100	65	125	60	150	38
26	56	51	175	76	158	101	94	126	78	151	10
27	59	52	223	77	154	102	22	127	59	153	3
										154	18
										155	18
										156	9
										157	12
										158	6
										159	6
										161	9

AGING O.L.R.TENSILE-STRAIN AT MAX STRESS.CHS=2.0 IN/MIN TP-H1011

WING O.L.R.TENSILE,STRAIN AT MAX STRESS,CHS=2.0 IN/MIN TP-H1011

This sample size summary is applicable to figures 11 thru 15

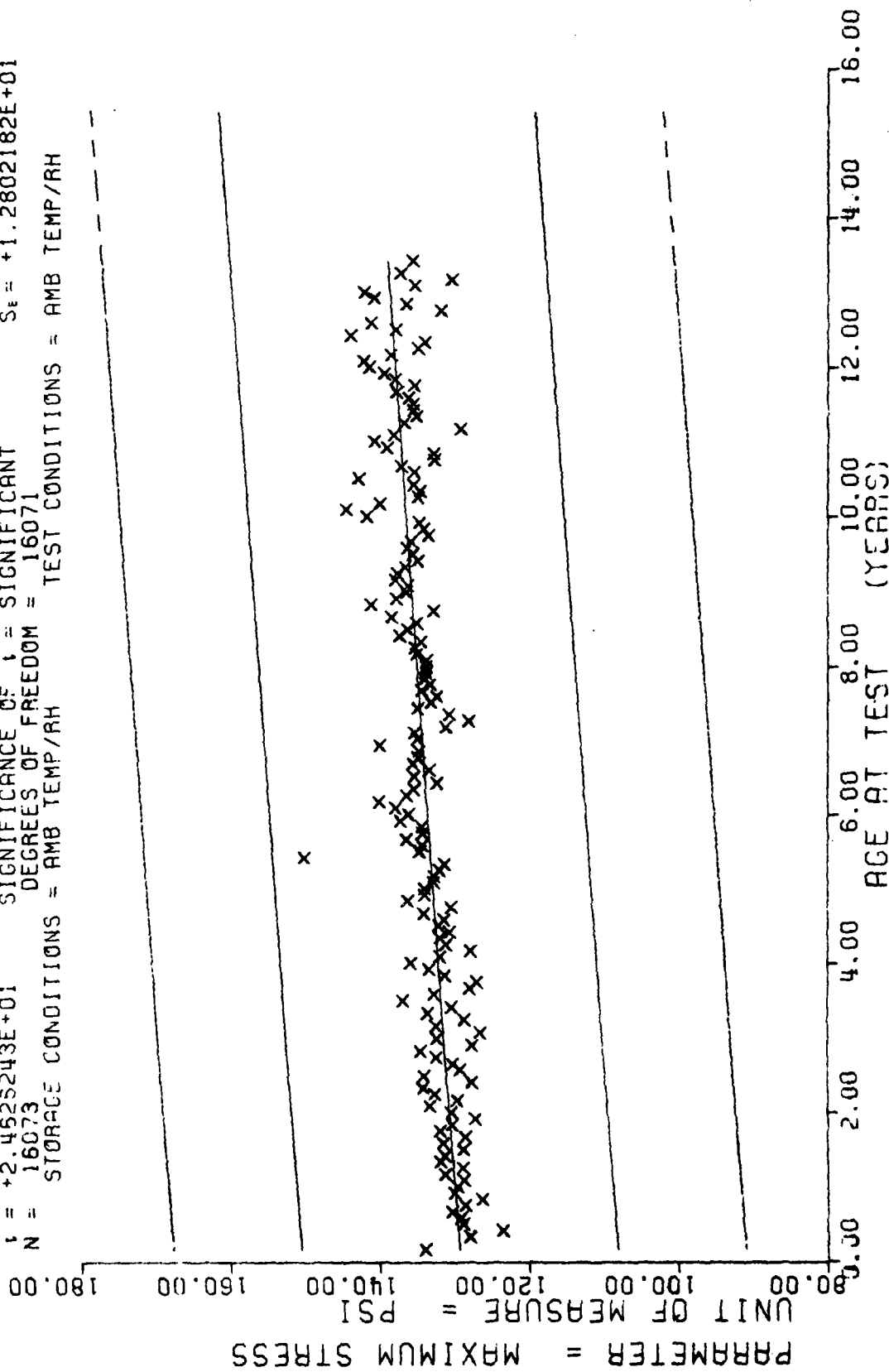
$Y = ((+2.6192397E-01) + (-8.3665510E-05) * X)$
 $F = +7.0108445E+01$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = -2.0445213E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +2.6477999E+01$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 16073$ DEGREES OF FREEDOM = 16071
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6.L.R. TENSILE STRAIN AT MAX STRESS, CHS=2.0 IN/MIN TP-H1011

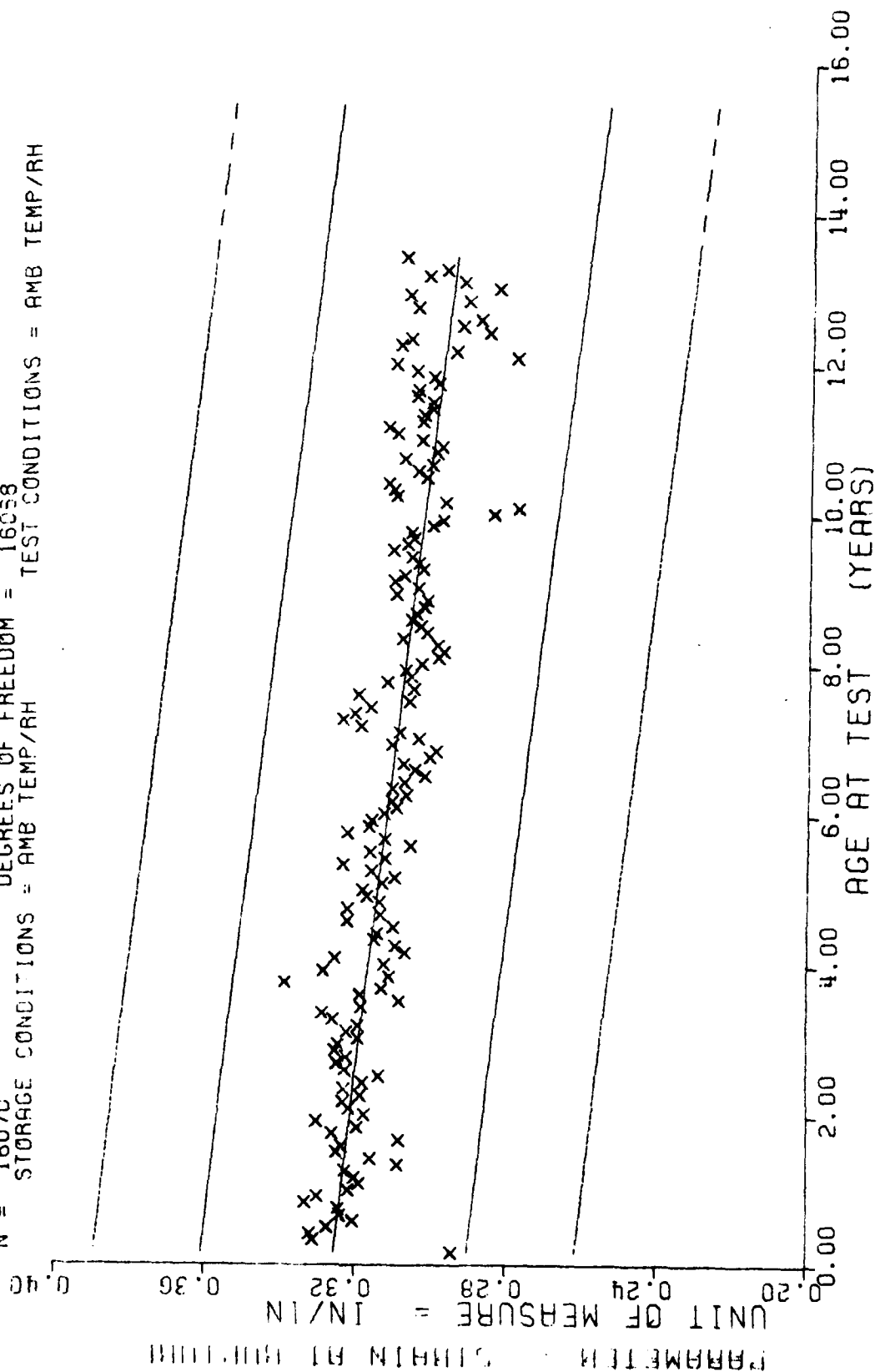
Figure 11

$Y = ((+1.2925149E+02) + (+6.0469578E-02) * X)$
 $F = +6.0545184E+02$ SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +1.3041089E+01$
 $R = +1.9069236E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_0 = +2.4554934E-03$
 $t = +2.4525243E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_e = +1.2802182E+01$
 $N = 16073$ DEGREES OF FREEDOM = 16071
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, L. R. TENSILE, MAXIMUM STRESS, CHS=2.0 IN/MIN TP-H1011

$Y = ((+3.2586479E-01) + (-1.9543312E-04) * X)$
 F = +2.2352052E+03 SIGNIFICANCE OF F = SIGNIFICANT
 R = -3.4945811E-01 SIGNIFICANCE OF R = SIGNIFICANT
 t = +4.7277357E+01 SIGNIFICANCE OF t = SIGNIFICANT
 N = 16070 DEGREES OF FREEDOM = 16058
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6.L.R. TENSILE, STRAIN AT RUPTURE, CHS=2.0 IN/MIN TP-H1011

Figure 13

$F = +5.3600850E+02$
 $R = +1.7967698E-01$
 $t = +2.3151857E+01$
 $N = 16069$
 $Y = ((+1.1909243E+02) + (+5.5338665E-02) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 16067
 STORAGE CONDITIONS = AMB TEMP/RH
 TEST CONDITIONS = AMB TEMP/RH

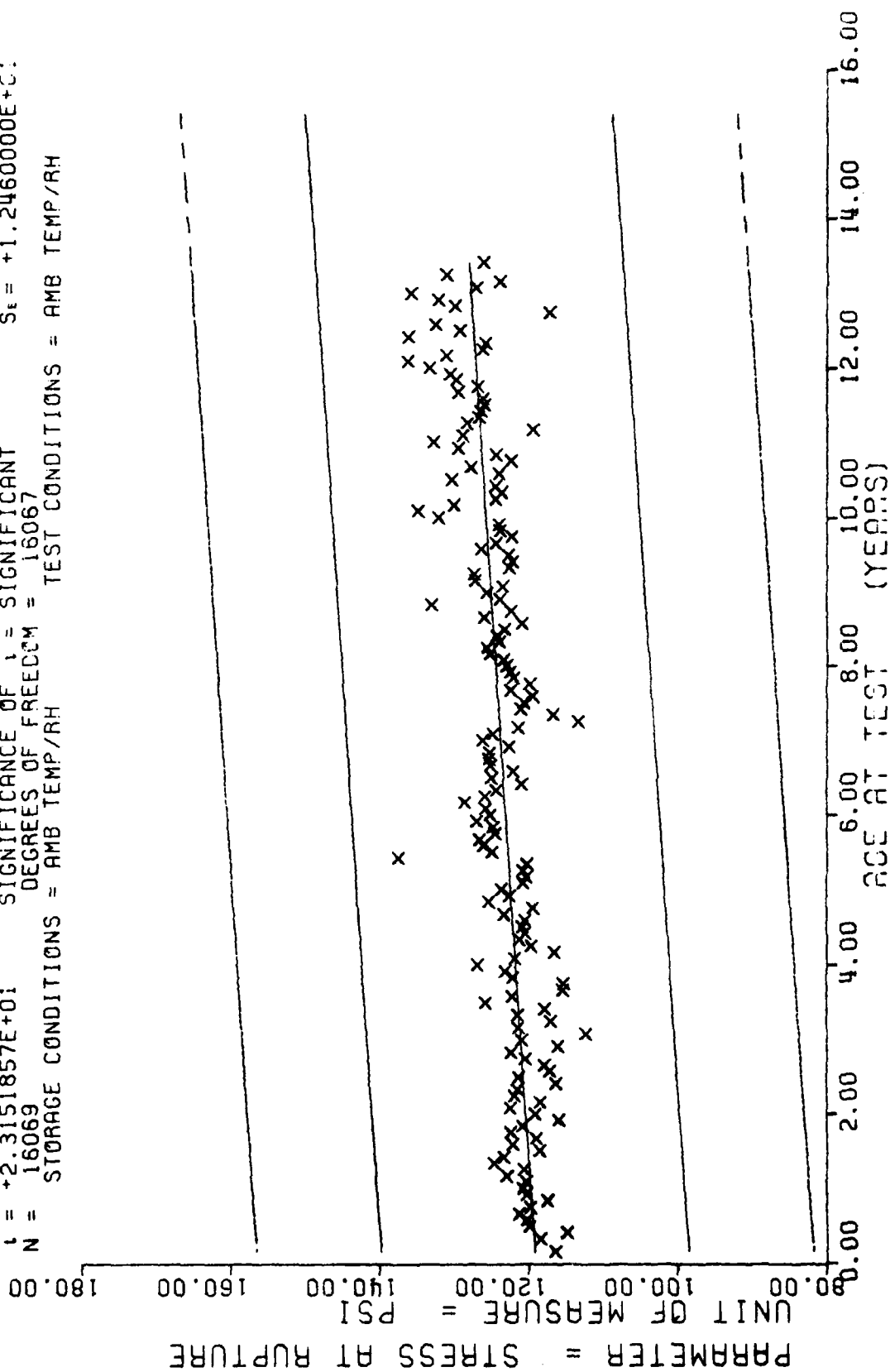


Figure 14

$Y = (1 + 9.3583772E+02) + (-1.0563893E+00) \times X1$
 $F = +1.4098657E+03$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +2.8405785E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +3.7548178E+01$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 16065$ DEGREES OF FREEDOM = 16063
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

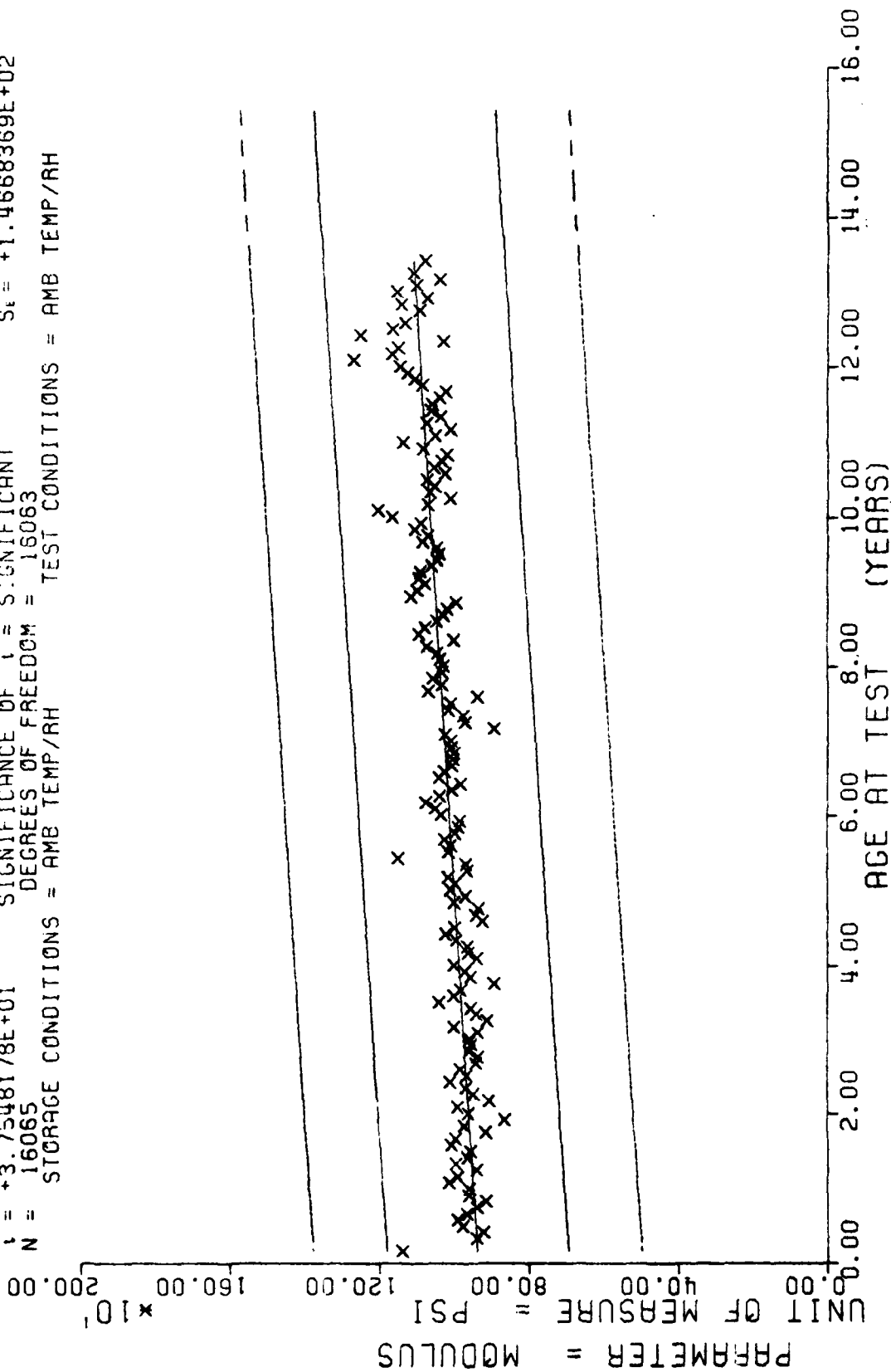


Figure 15

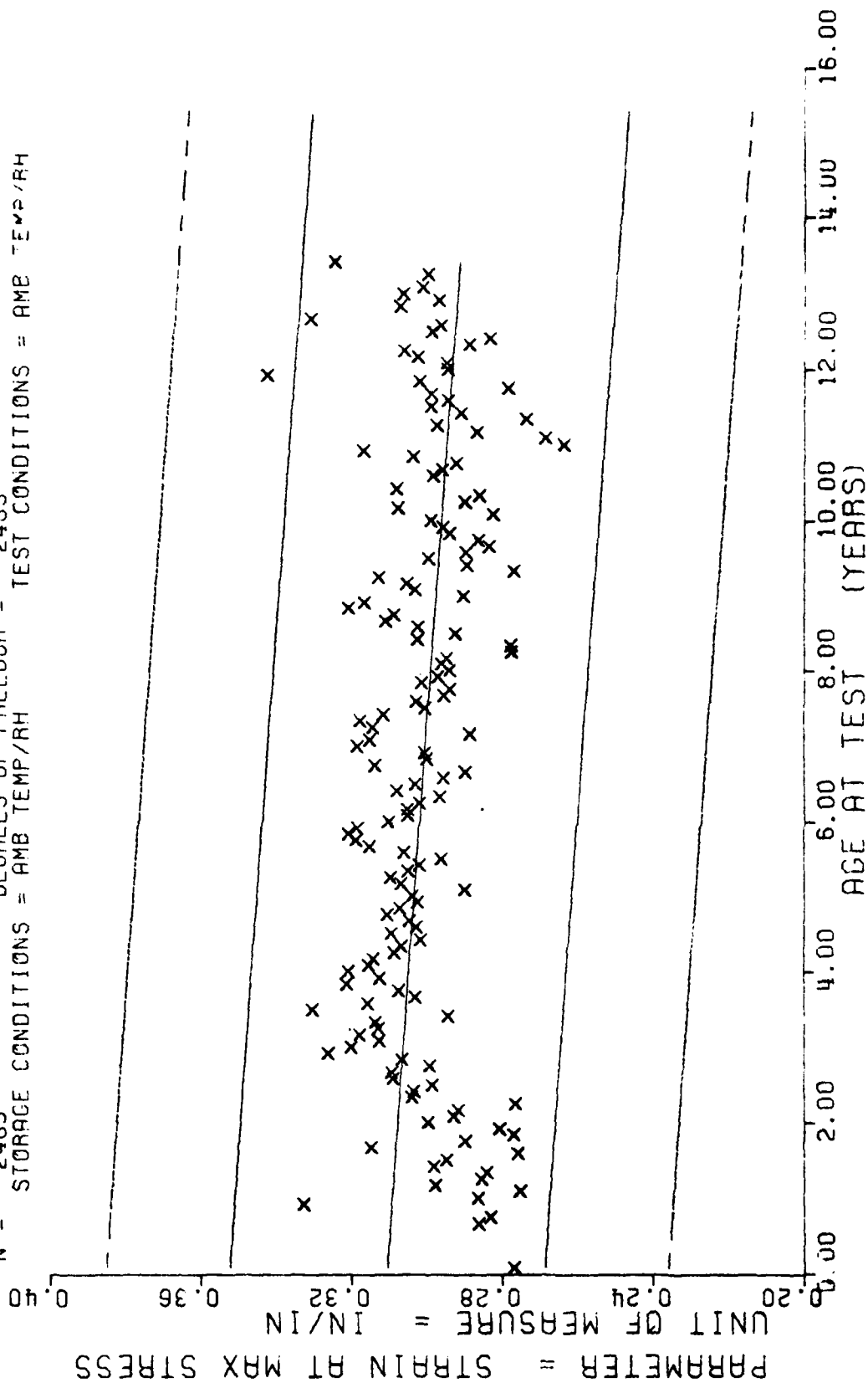
*** SAMPLE SIZE SUMMARY ***

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
1	2	33	23	58	30	83	9	108	8
6	2	34	22	59	21	84	8	109	17
9	4	35	24	60	10	85	14	110	32
11	4	36	26	61	26	86	8	111	8
12	14	37	16	62	30	87	10	112	6
13	17	38	11	63	34	88	16	113	16
14	0	39	25	64	40	89	19	114	45
15	6	40	10	65	26	90	19	115	53
16	0	41	6	66	27	91	22	116	57
17	4	42	6	67	24	92	6	117	40
18	14	43	2	68	29	93	12	118	21
19	11	44	4	69	24	94	16	119	21
20	20	45	2	70	59	95	14	120	39
21	4	46	6	71	38	96	12	121	8
22	10	47	18	72	21	97	22	122	12
23	6	48	5	73	32	98	18	123	9
24	8	49	34	74	27	99	26	124	2
25	23	50	34	75	22	100	16	125	6
26	13	51	24	76	20	101	13	127	6
27	11	52	42	77	13	102	8	128	6
28	17	53	42	78	14	103	6	129	4
29	14	54	14	79	27	104	9	130	19
30	18	55	30	80	14	105	8	131	16
31	16	56	22	81	15	106	4	132	43
32	23	57	30	82	22	107	2	133	30

WING 6.H.R.TRIAXIAL TENSILE-STRAIN AT MAX STRESS.CHS=1750 IN/MIN.800 PSI

This sample size summary is applicable to figures 16 thru 20

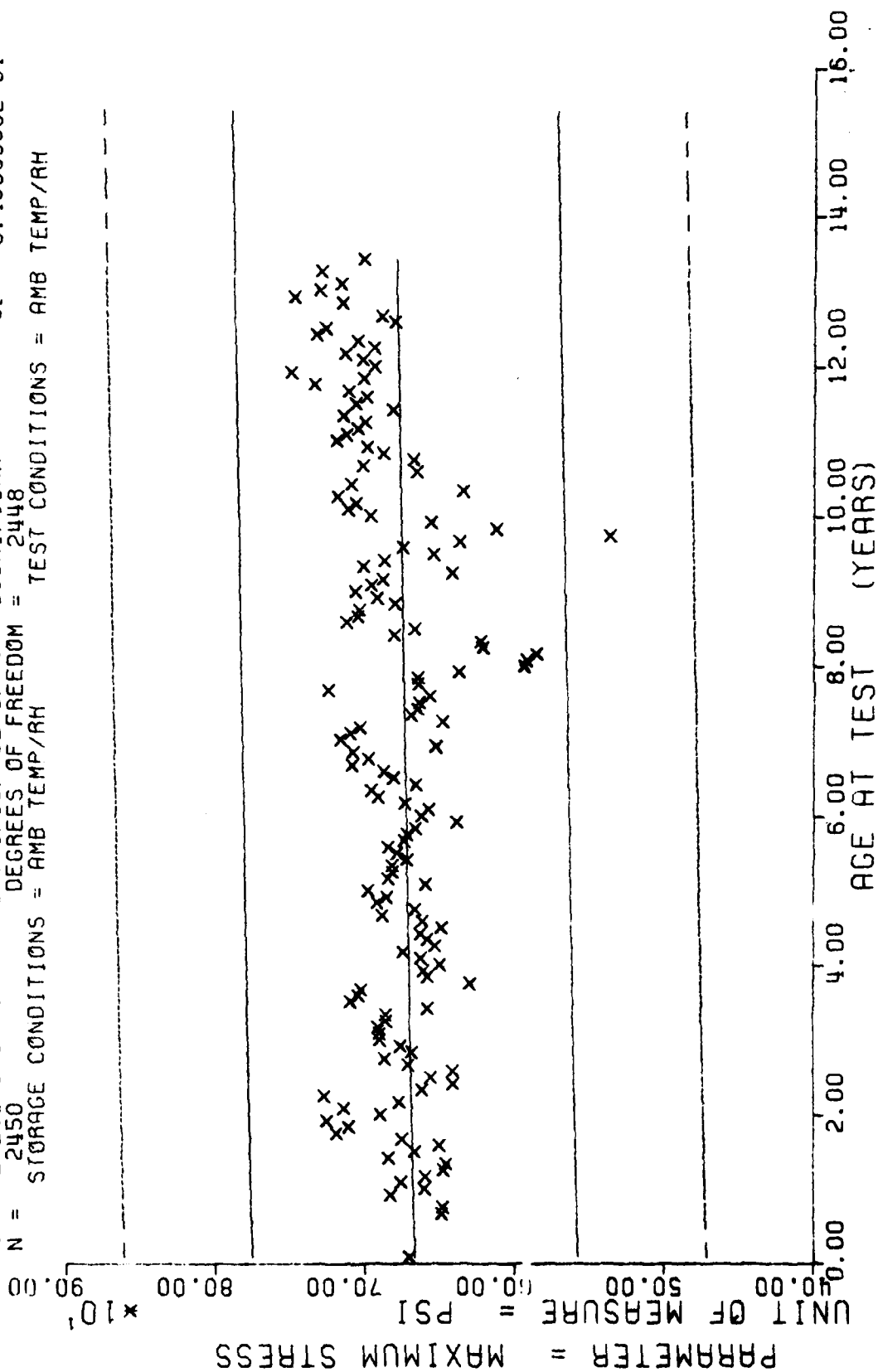
$Y = ((+3.1069834E-01) + (-1.2000908E-04) * X)$
 $F = +7.7930549E+01$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = -1.7512875E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +8.8278281E+00$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 2465$ DEGREES OF FREEDOM = 2463
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, H.A. TRIAXIAL TENSILE, STRAIN AT MAX STRESS, CHS-1750 IN/MIN, 800 PSI

Figure 16

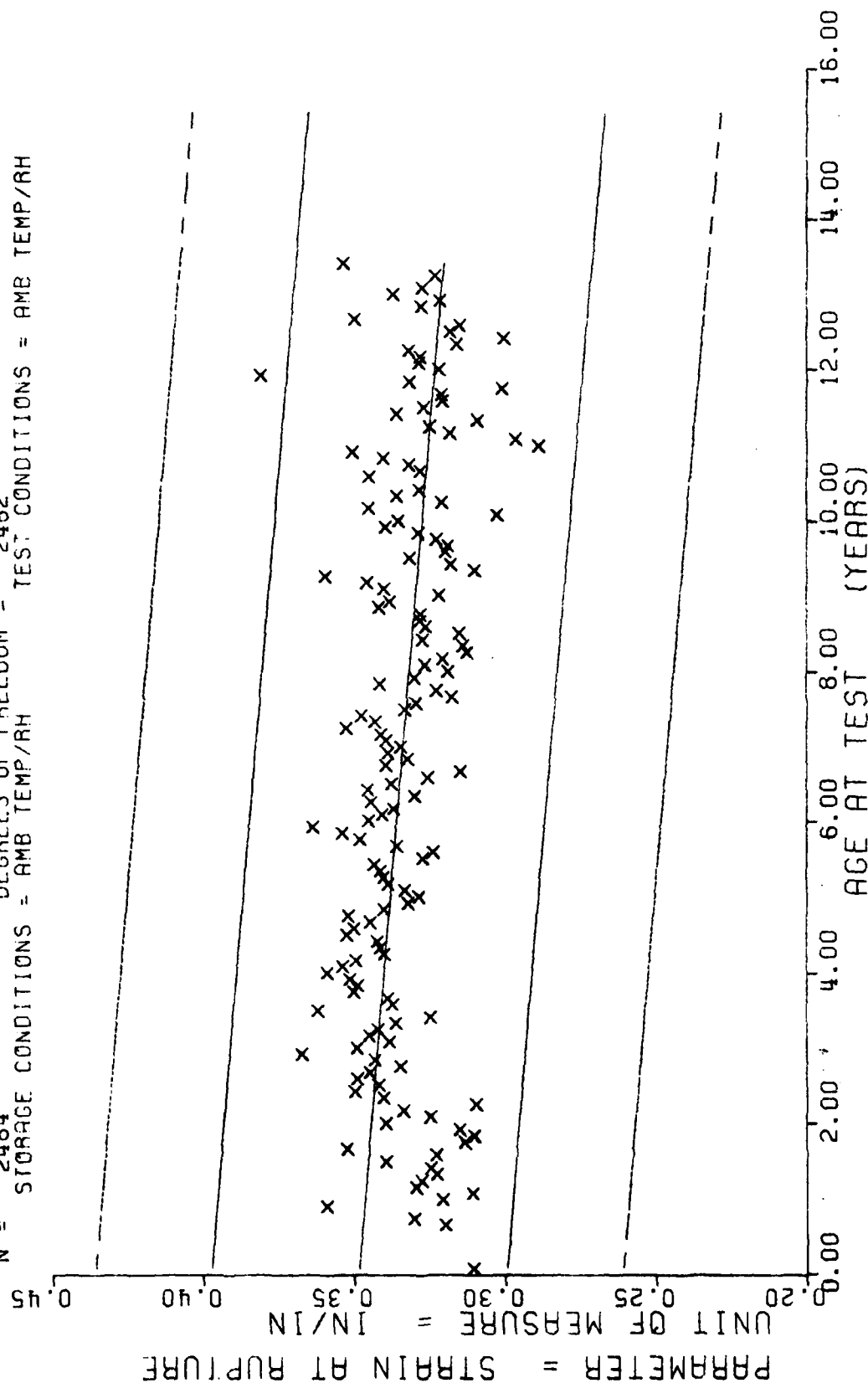
$F = +5.1384032E+00$
 $R = +4.5767065E-02$
 $t = +2.2668046E+00$
 $N = 2450$
 $Y = ((+6.6656842E+02) + (+8.0508585E-02) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 2448
 STORAGE CONDITIONS = AMB TEMP/RH
 TEST CONDITIONS = AMB TEMP/RH



WING 6.H.R. TRIAXIAL TENSILE, MAXIMUM STRESS, CHS=1750 IN/MIN, 800 PSI

Figure 17

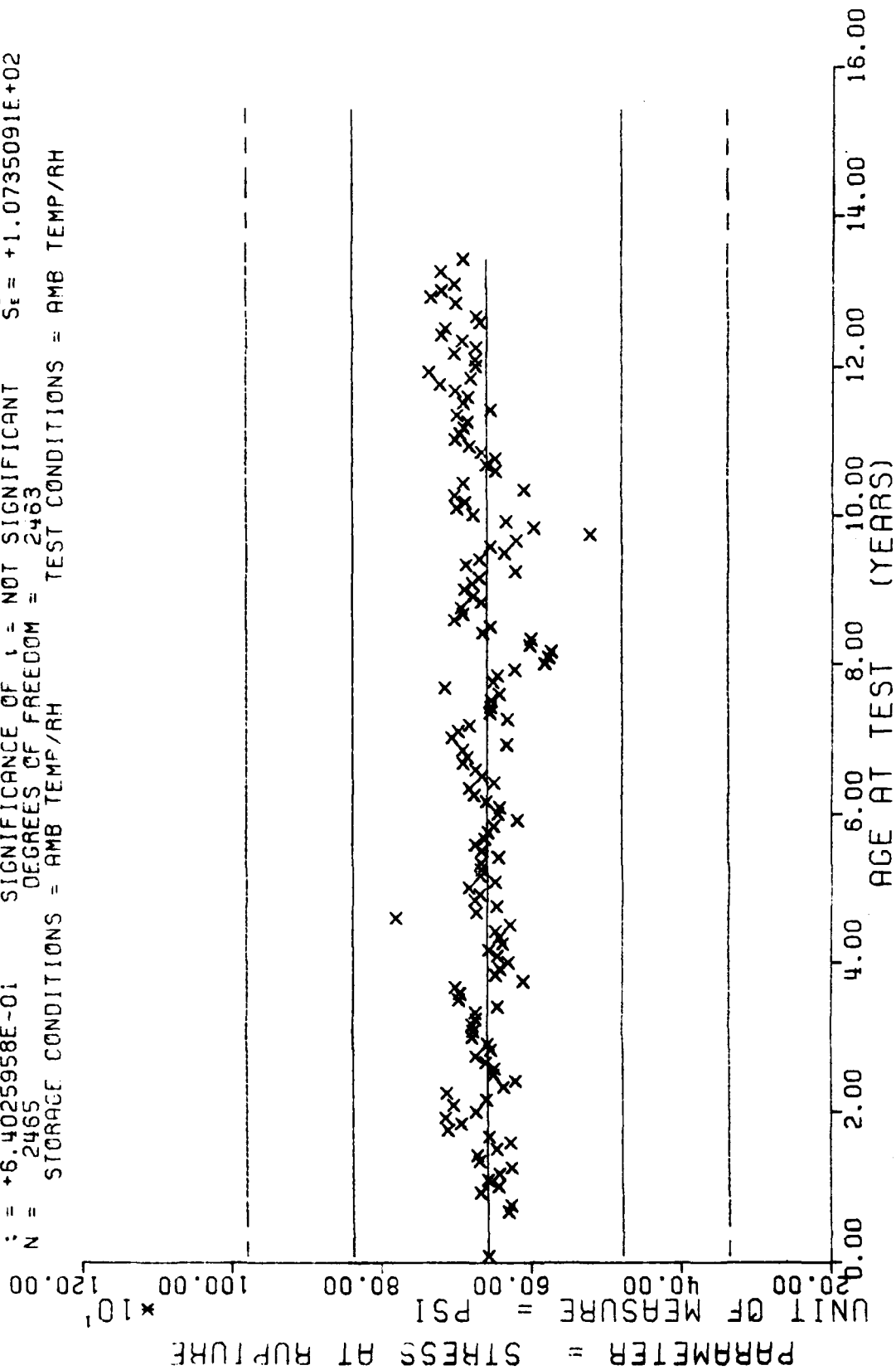
$Y = ((+3.4851422E-01) + (-1.7603063E-04) * X)$
 $F = +1.2215572E+02$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = -2.1741904E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +1.1052408E+01$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 2464$ DEGREES OF FREEDOM = 2462
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, H.R. TRIAXIAL TENSILE, STRAIN AT RUPTURE, CHS=1750 IN/MIN, 600 PSI

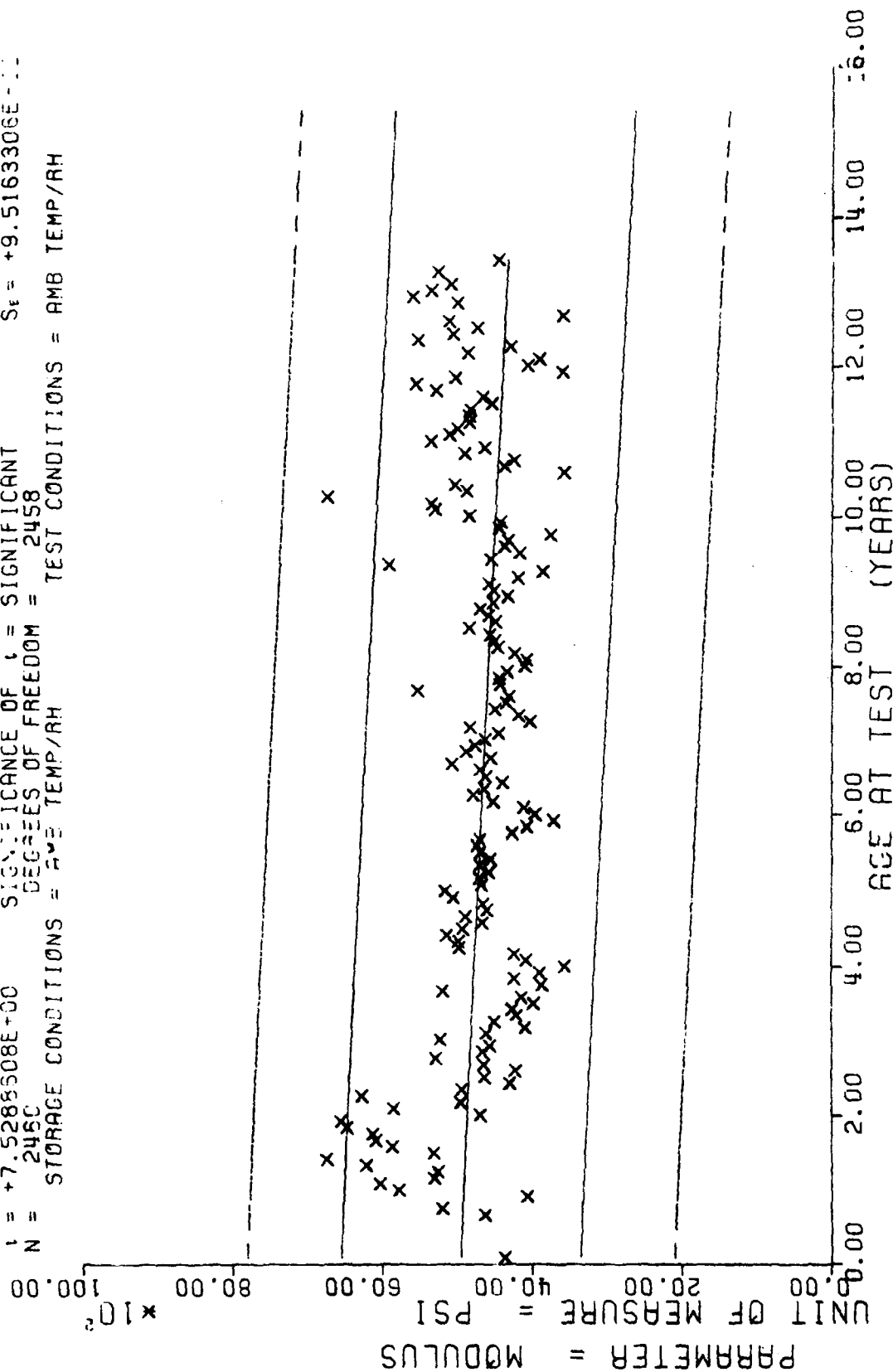
Figure 18

$Y = ((+6.5739026E+02) + (+3.7561655E-02) * X)$
 $F = +4.0993233E-01$ SIGNIFICANCE OF F = NOT SIGNIFICANT $G_1 = +1.0733805E+02$
 $R = +1.2899941E-02$ SIGNIFICANCE OF R = NOT SIGNIFICANT $S_0 = +5.8666290E-02$
 $S = +6.4025958E-01$ SIGNIFICANCE OF S = NOT SIGNIFICANT $S_e = +1.0735091E+02$
 $N = 2465$ DEGREES OF FREEDOM = 2463
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, H.R. TRIAXIAL TENSILE, STRESS AT RUPTURE, CHS=1750 IN/MIN, 800 PSI

$Y = ((+1.5509446E+03) + (-3.9209550E+00) * X)$
 $F = +5.6683745E+01$ SIGNIFICANCE OF F = SIGNIFICANT $\sigma_f = +9.6234754E-11$
 $R = -1.5013694E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_b = +5.2078994E-11$
 $t = +7.5286508E+00$ SIGNIFICANCE OF t = SIGNIFICANT $S_f = +9.5163306E-11$
 $N = 2458$ DEGREES OF FREEDOM = 2458
 STORAGE CONDITIONS = AVE TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, H.R. TRIAXIAL TENSILE, MODULUS, CHS=1750 IN/MIN AT 800 PSI

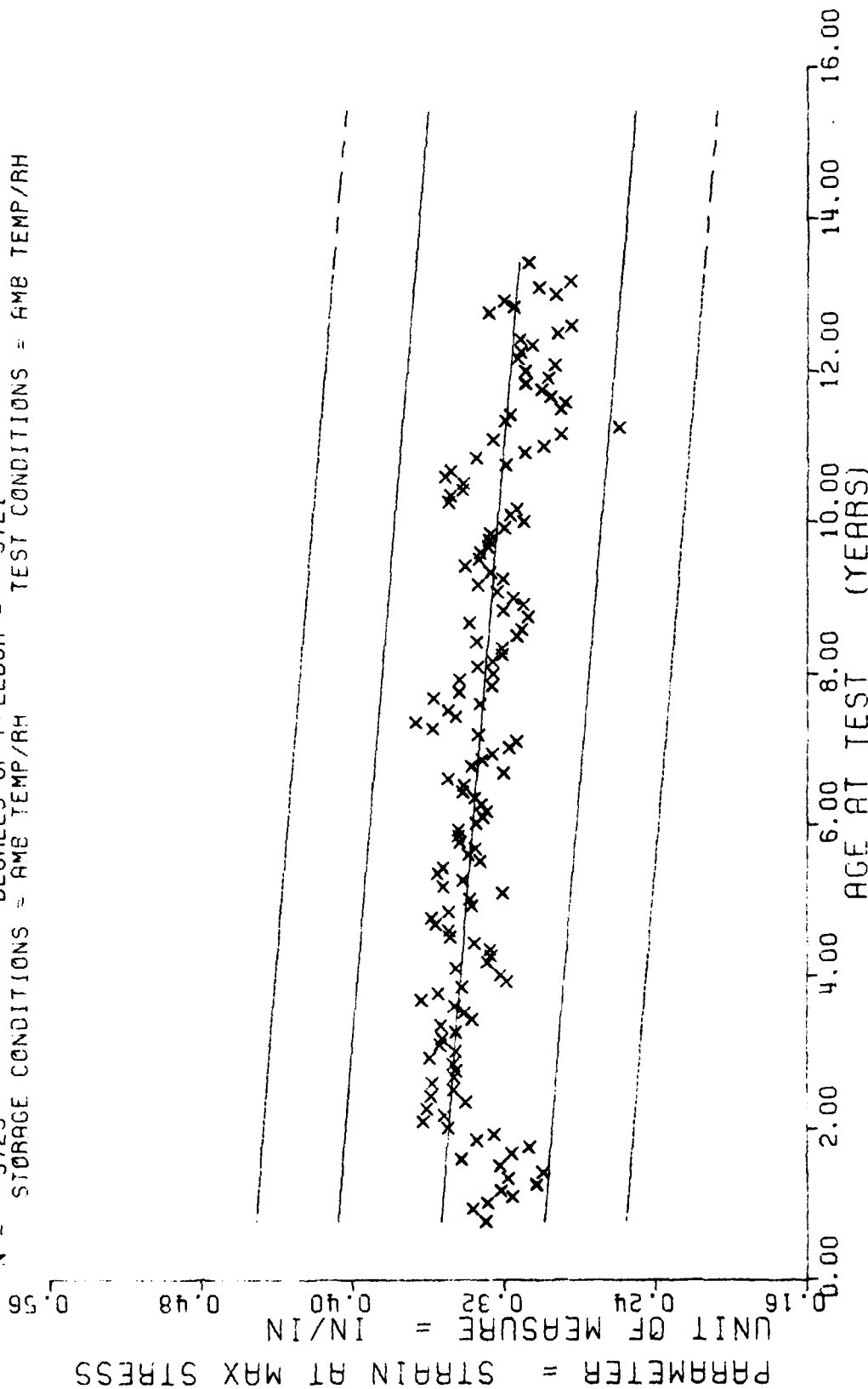
Figure 20

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
35	2	63	28	85	15	110	40	135	11
36	12	61	37	86	11	111	17	136	10
37	12	62	62	87	27	112	10	137	19
38	18	63	114	88	21	113	79	138	51
39	4	64	41	89	46	114	53	139	65
40	12	65	41	90	50	115	29	140	6
41	8	66	18	91	28	116	32	141	10
42	12	67	13	92	16	117	118	142	10
43	14	68	48	93	28	118	31	143	6
44	4	69	47	94	31	119	34	144	17
45	4	70	49	95	19	120	48	145	12
46	24	71	40	96	27	121	25	146	36
47	4	72	38	97	32	122	6	147	18
48	2	73	73	98	25	123	17	148	7
49	16	74	49	99	17	124	14	149	7
50	24	75	41	100	14	125	34	150	8
51	12	76	29	101	21	126	16	151	2
52	31	77	19	102	9	127	24	153	2
53	20	78	30	103	7	128	28	154	4
54	37	79	63	104	24	129	12	155	2
55	28	80	20	105	7	130	23	156	2
56	29	81	17	106	9	131	28	157	3
57	42	82	24	107	12	132	30	158	2
58	24	83	23	108	12	133	11	161	2
59	21	84	8	109	21	134	34		

MINING 5, H. R. HYDROSTATIC, STRAIN AT MAX STRESS, 1750 IN/MIN, 800 PSI

This sample size summary is applicable to figures 21 thru 25

$Y = (1 + 3.5588319E-01) + (-2.7233000E-04) * X$
 $R = +3.3223145E-02$ SIGNIFICANCE OF F = SIGNIFICANT $S_e = +3.3999160E-02$
 $R = -2.8629889E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_e = +1.4952272E-05$
 $R = +1.8227217E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_e = +3.2580344E-02$
 $N = 3723$ DEGREES OF FREEDOM = 3721
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6, H.R. HYDROSTATIC STRAIN AT MAX STRESS, 1750 IN/MIN, 800 PSI

Figure 21

$Y = ((+4.8437941E+02) + (+5.1048477E-01) * X)$
 $F = +1.2508044E-02$ SIGNIFICANCE OF F = SIGNIFICANT $\sigma_r = +1.0110148E+02$
 $R = +1.8033728E-03$ SIGNIFICANCE OF R = SIGNIFICANT $S_e = +4.564461E-02$
 $t = +1.1183937E+03$ SIGNIFICANCE OF t = SIGNIFICANT $S_e = +9.9457272E+01$
 $N = 3723$ DEGREES OF FREEDOM = 3721
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

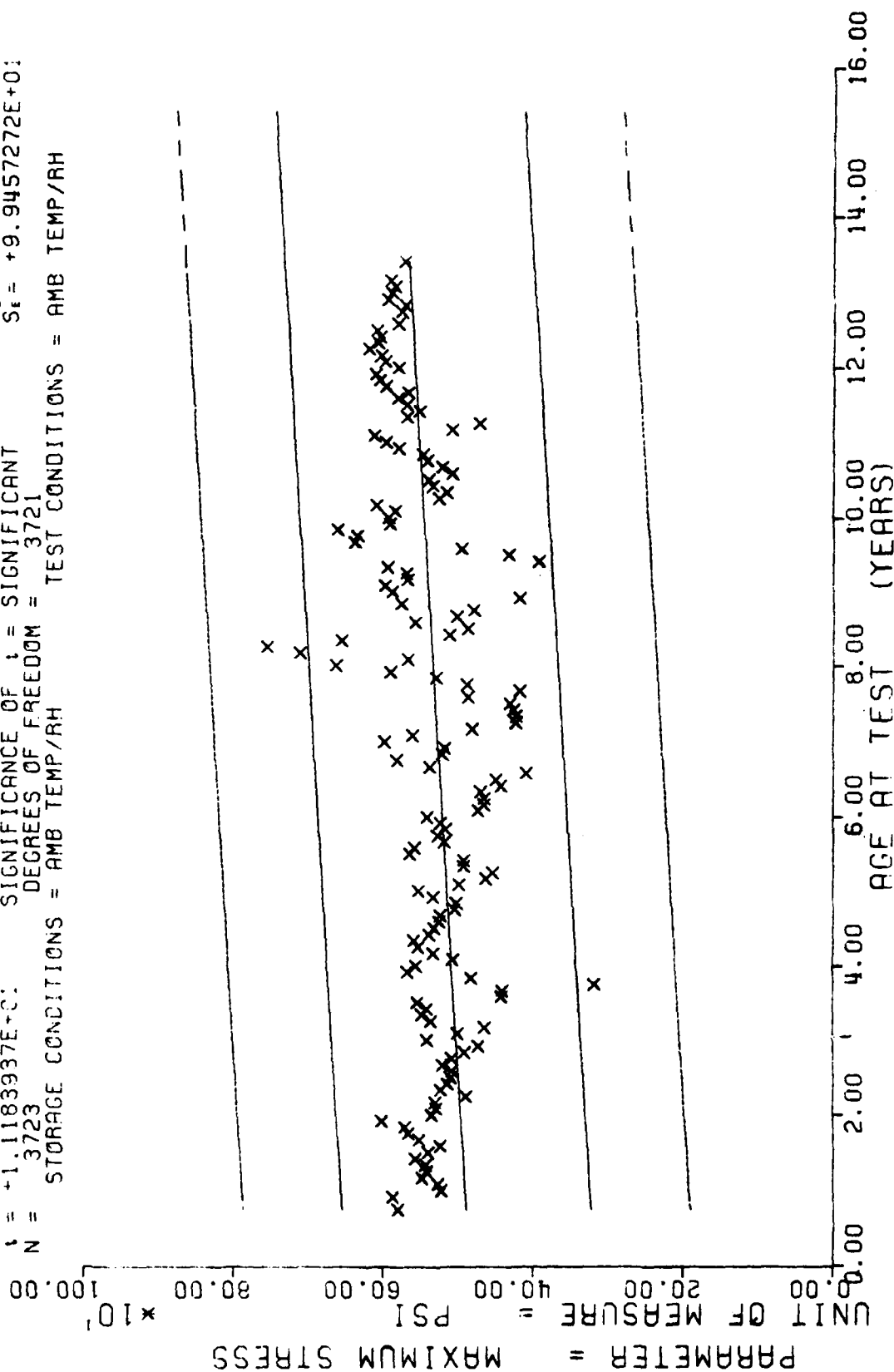


Figure 22

$Y = ((+4.2480003E-01) + (-2.9508579E-04)) * X$
 $F = +3.1433837E+02$ SIGNIFICANCE OF F = SIGNIFICANT $G = +3.774344E-02$
 $R = -2.7918915E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_A = +1.3342352E-05$
 $t = +1.7731014E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_F = +3.3245185E-02$
 $N = 3721$ DEGREES OF FREEDOM = 3719
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

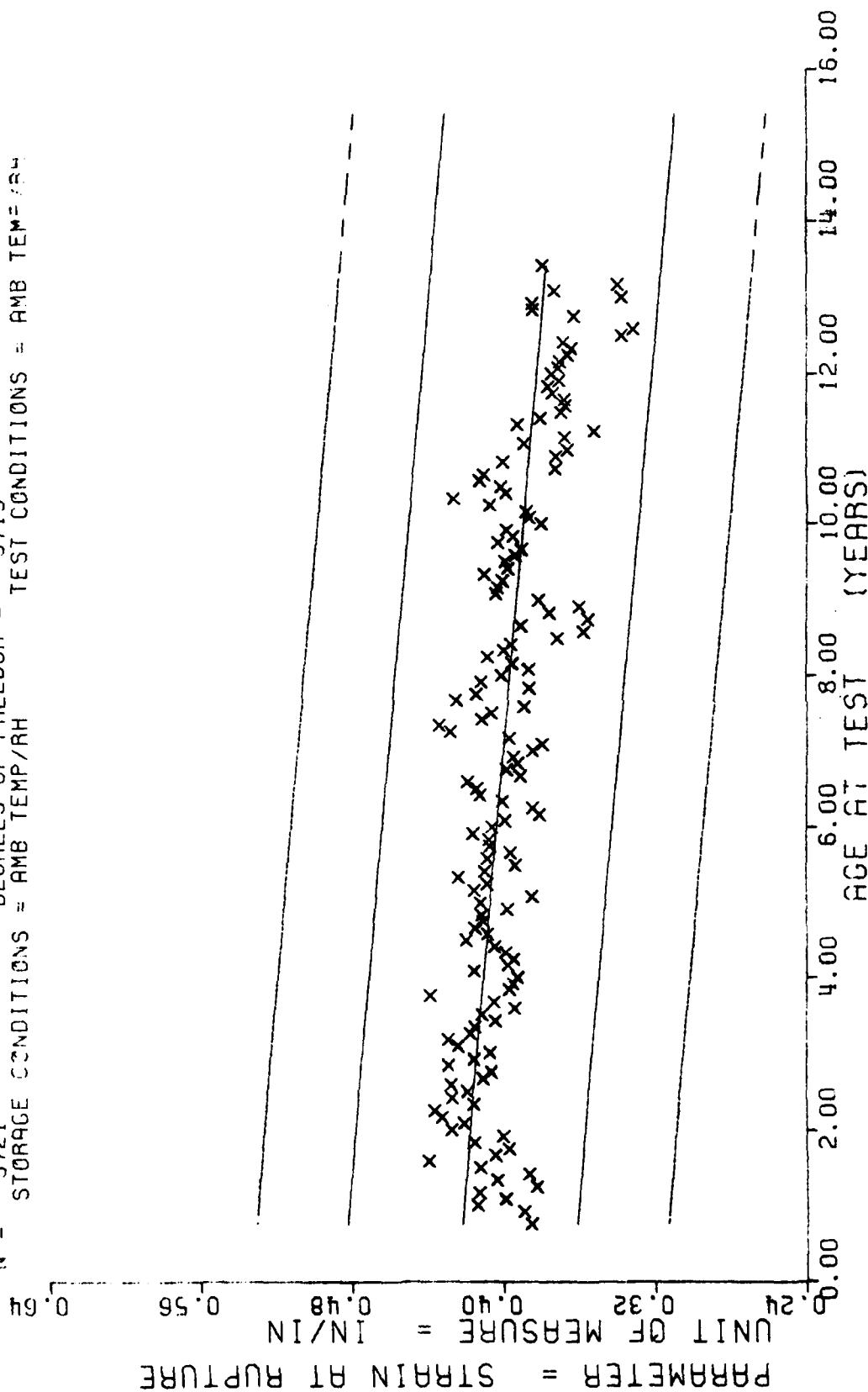


Figure 23

$F = +1.2776295E+02$
 $R = +1.8219727E-01$
 $t = +1.1303227E+01$
 $N = 3723$
 $Y = ((+4.5365280E+02) + (+4.7834793E-01) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 3721
 STORAGE CONDITIONS = AMB TEMP/RH
 TEST CONDITIONS = AMB TEMP/RH

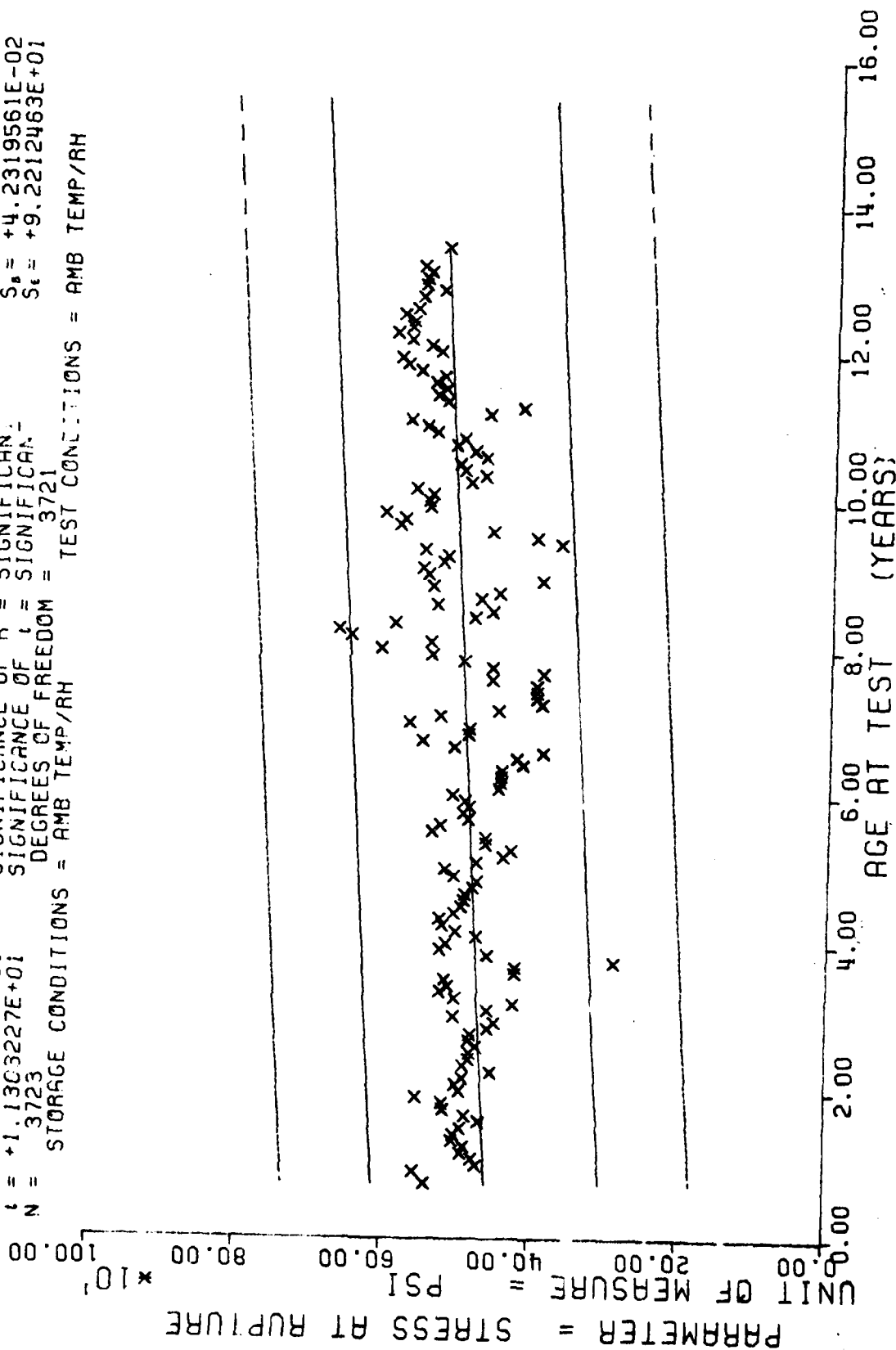


Figure 24

$Y = ((+3.4318039E+03) + (+1.9662108E+00) * X)$
 $F = +9.1962828E+00$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +4.9659065E-02$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +3.0325373E+00$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 3722$ DEGREES OF FREEDOM = 3720
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

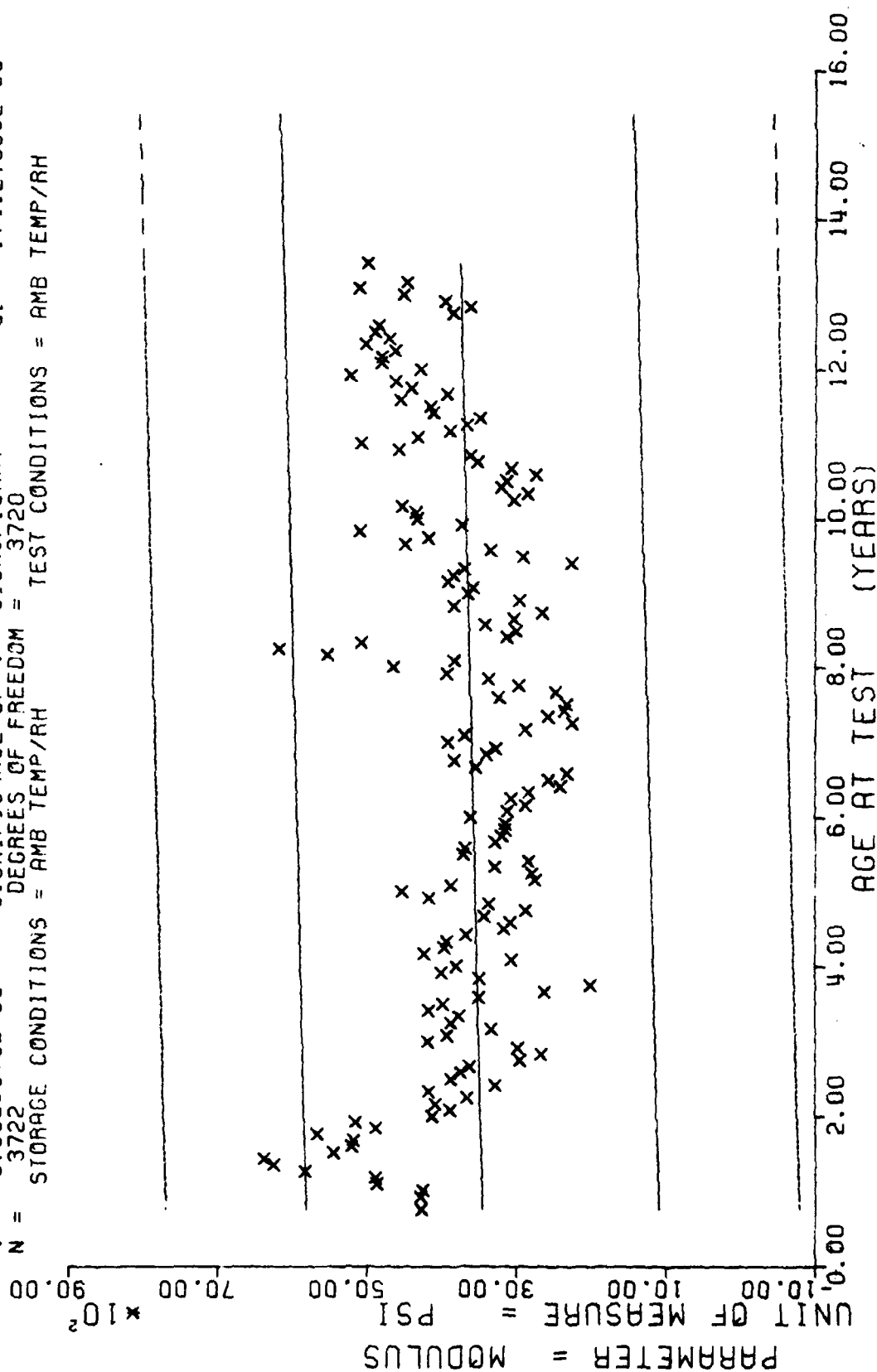


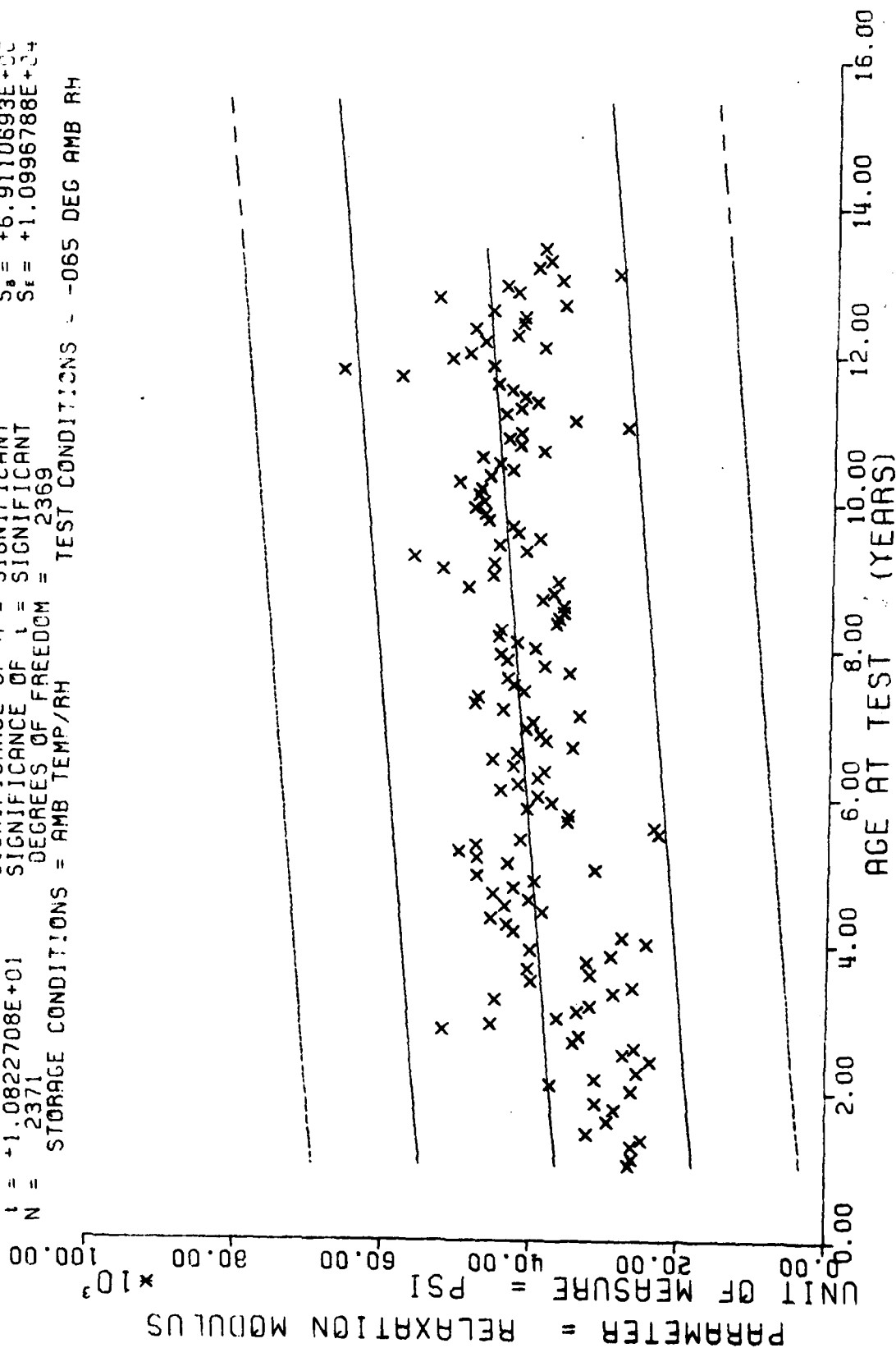
Figure 25

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
12	2	42	6	67	9	92	9	117	27
13	3	43	12	68	9	93	25	118	21
15	1	44	3	69	20	94	23	119	19
15	3	45	6	70	30	95	23	120	36
17	4	46	3	71	41	96	48	121	21
19	3	47	6	72	30	97	54	122	3
21	4	48	6	73	39	98	52	123	6
22	3	49	2	74	32	99	35	124	27
24	6	50	26	75	32	100	23	125	20
25	6	51	49	76	17	101	24	126	21
26	9	52	46	77	40	102	8	127	12
27	3	53	18	78	28	103	15	128	23
29	3	54	27	79	15	104	12	129	2
30	3	55	27	80	17	105	6	130	36
31	3	56	21	81	23	106	3	131	33
32	6	57	24	82	35	107	9	132	8
33	6	58	20	83	12	108	12	133	18
34	3	59	9	84	17	109	15	134	25
35	6	60	9	85	18	110	9	135	18
36	19	61	21	86	9	111	3	136	2
37	9	62	46	87	33	112	8	137	6
38	8	63	23	88	19	113	45	138	34
39	6	64	30	89	21	114	35	139	42
40	8	65	9	90	24	115	43	140	6
41	6	66	2	91	11	116	36	141	12

WING 6. STRESS RELAXATION MODULUS, 0.5% STRAIN, 10 SEC., -65 DEG F. TPH-1011

This sample size summary is applicable to figures 26 and 27

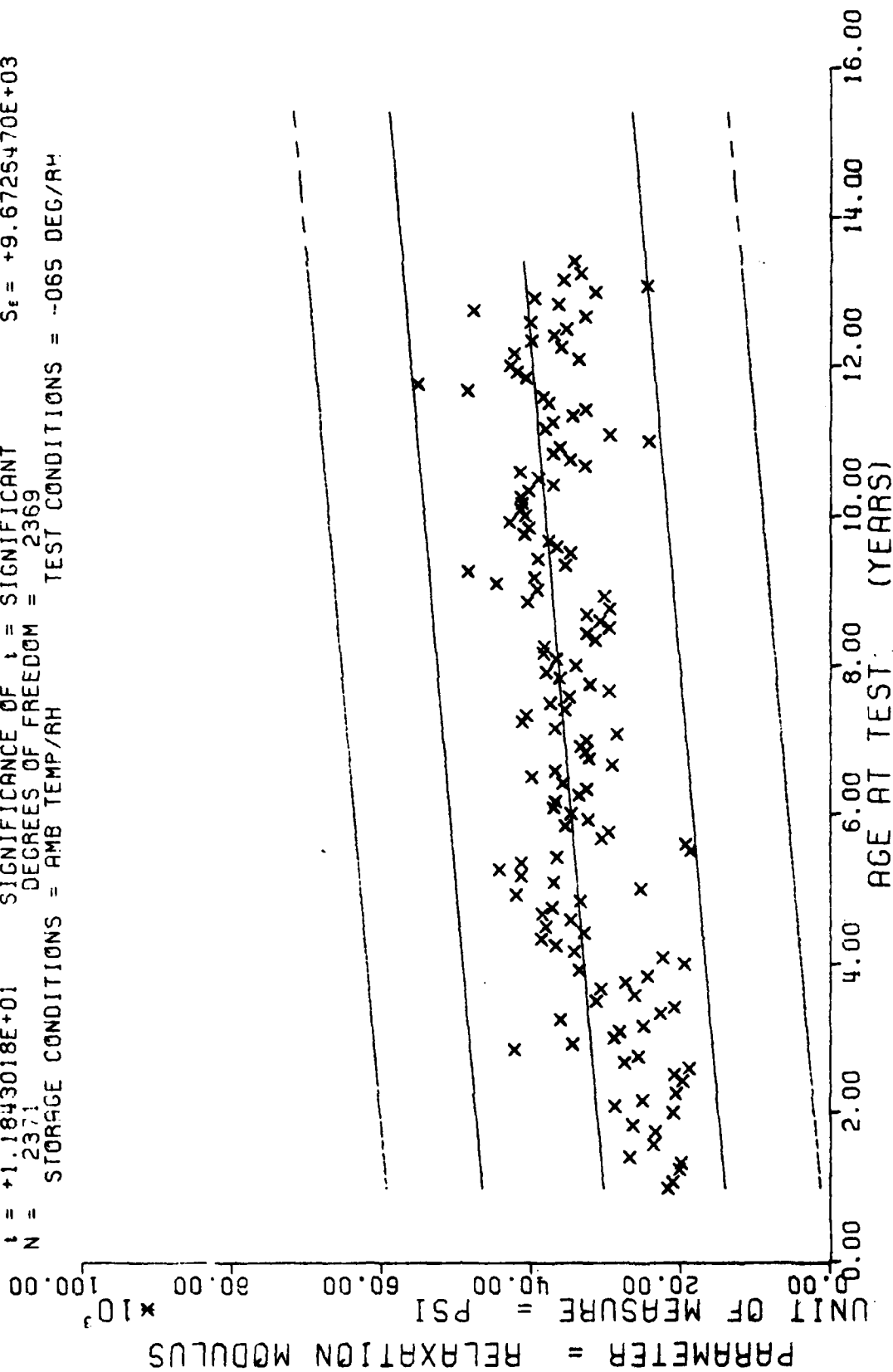
$F = +1.1713101E+02$
 $R = +2.1705707E-01$
 $t = +1.0822708E+01$
 $N = 2371$
 STORAGE CONDITIONS = AMB TEMP/RH
 $Y = ((-3.5520529E+04) + (-7.4700000E+01) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 2369
 TEST CONDITIONS = -065 DEG AMB RH
 $G_1 = +1.1262000E+04$
 $S_1 = +6.9110693E+00$
 $S_2 = +1.0996788E+04$



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 10 SEC, -65 DEG F, TPH-1011

Figure 26

$Y = ((+2.9448082E+04) + (+7.1992479E+01) * X)$
 $F = +1.4C25709E+02$ SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +9.9527549E+03$
 $R = +2.3542306E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_1 = +6.0788959E+00$
 $t = +1.1843018E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_2 = +9.6725470E+03$
 $N = 2371$ DEGREES OF FREEDOM = 2369
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -065 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 50 SEC, -65 DEG F, TPH-1011

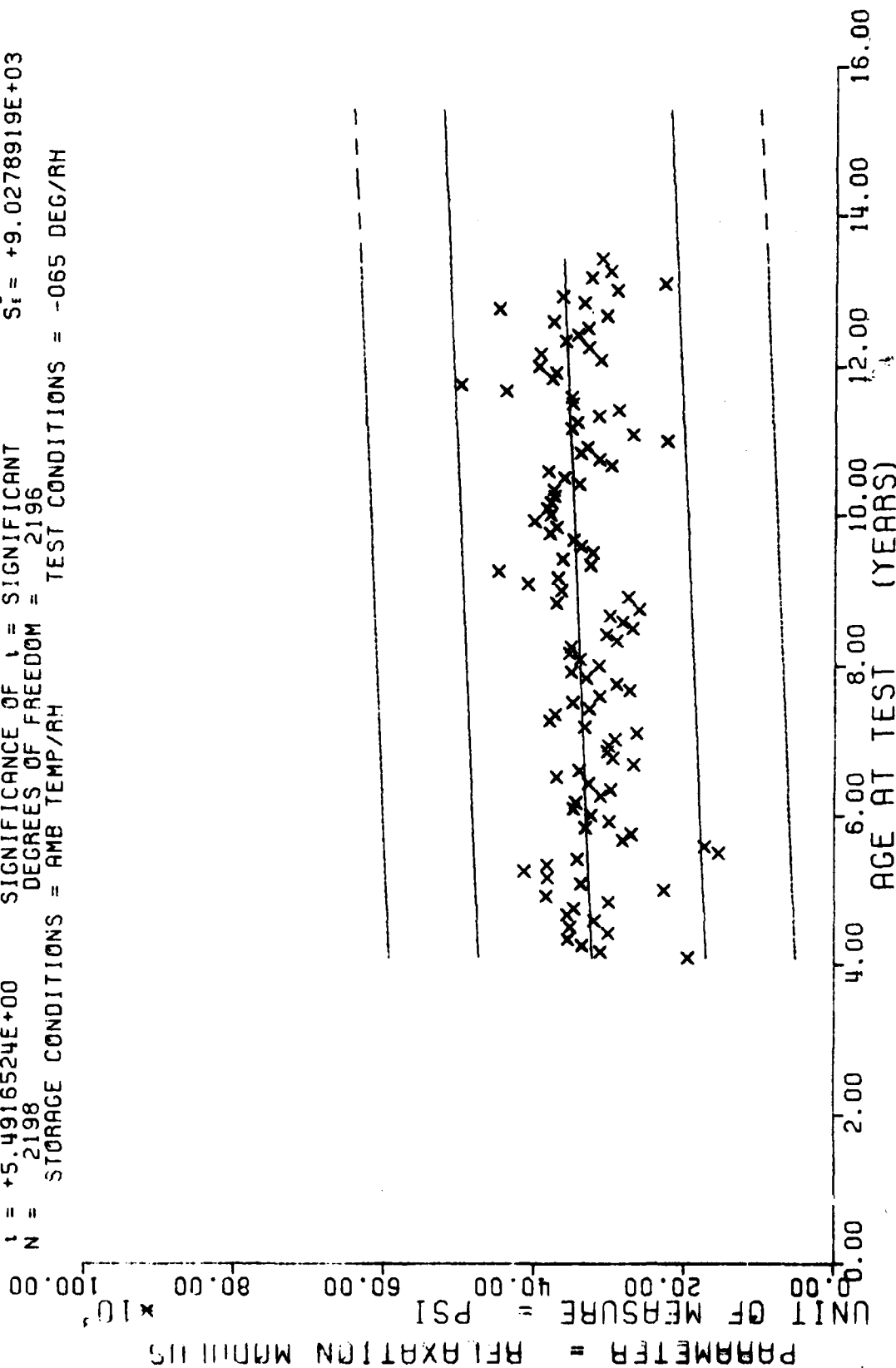
*** SAMPLE SIZE SUMMARY ***

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
49	2	74	32	99	30	124	27
50	20	75	32	100	25	125	20
51	43	76	17	101	24	126	21
52	40	77	40	102	8	127	12
53	16	78	28	103	15	128	23
54	27	79	15	104	12	129	2
55	27	80	17	105	6	130	36
56	21	81	23	106	3	131	33
57	24	82	35	107	9	132	8
58	20	83	12	108	12	133	18
59	3	84	17	109	15	134	25
60	3	85	18	110	9	135	18
61	21	86	9	111	3	136	2
62	46	87	32	112	6	137	6
63	23	88	19	113	40	138	34
64	30	89	21	114	35	139	42
65	9	90	24	115	43	140	6
66	2	91	11	116	30	141	12
67	9	92	9	117	27	142	12
68	9	93	25	118	21	143	36
69	20	94	23	119	19	144	6
70	30	95	23	120	30	145	3
71	41	96	48	121	21	146	6
72	30	97	54	122	3	147	9
73	39	98	52	123	6	148	3

WING 6. STRESS RELAXATION MODULUS, 0.5% STRAIN, 100 SEC. - 65 DEG F. TPH-1011

This sample size summary is applicable to figures 28 and 29

$Y = ((+3.0490509E+04) + (+3.6083861E+01) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF χ^2 = SIGNIFICANT
 N = 2198 DEGREES OF FREEDOM = 2196
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -065 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 100 SEC. -65 DEG F, TPH-1011

$Y = ((+2.4014364E+04) + (-1.5432112E+01) \cdot X)$
 $F = +8.4115533E+00$ SIGNIFICANCE OF F = SIGNIFICANT $F = +7.3520222E+03$
 $R = +6.1155356E-02$ SIGNIFICANCE OF R = SIGNIFICANT $R = +5.3419425E+00$
 $t = +2.9000353E+00$ SIGNIFICANCE OF t = SIGNIFICANT $t = +7.3396541E+03$
 $N = 2135$ DEGREES OF FREEDOM = 2196
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -65 DEG/RH

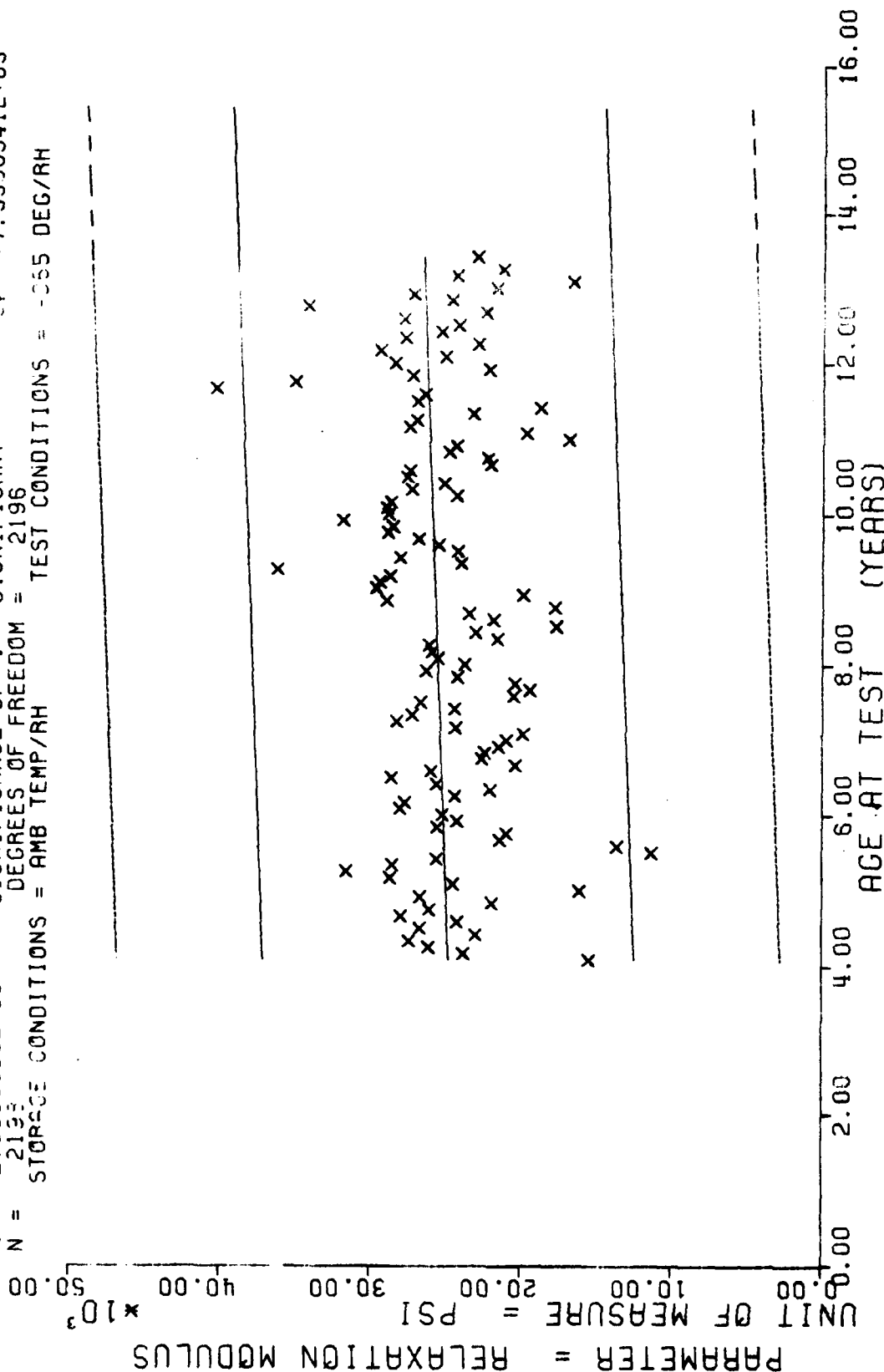
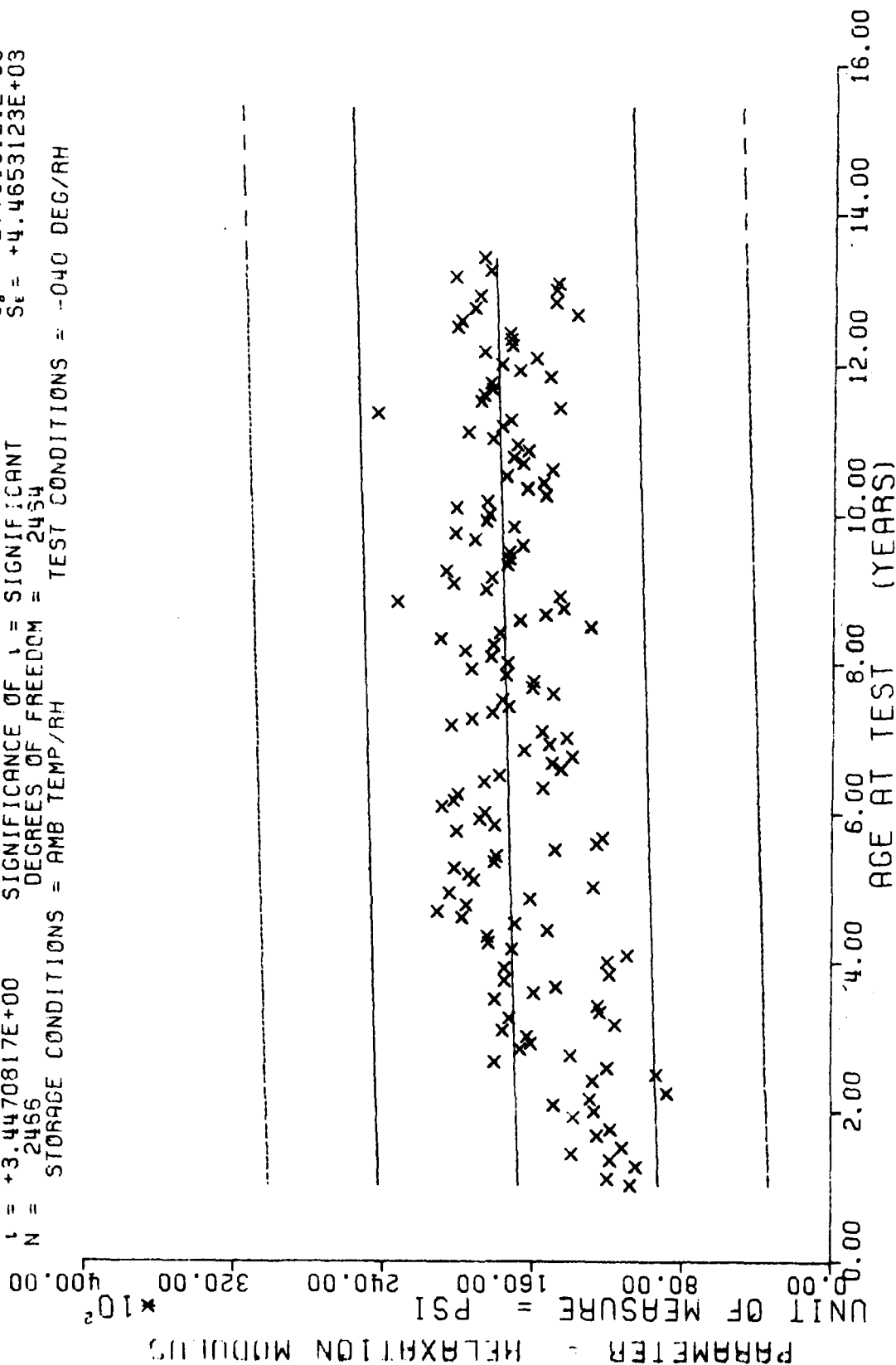


Figure 29

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
12	3	41	2	56	0	91	15	116	43
13	3	42	3	67	6	92	24	117	21
15	3	43	9	68	12	93	18	118	21
16	3	44	3	69	3	94	19	119	15
17	7	45	6	70	30	95	18	120	29
18	3	46	3	71	44	96	54	121	21
20	3	47	9	72	30	97	68	122	3
21	6	48	3	73	35	98	51	123	8
23	3	49	0	74	34	99	36	124	16
24	2	50	27	75	28	100	21	125	16
25	0	51	51	76	29	101	21	126	19
26	7	52	47	77	36	102	6	127	44
27	2	53	14	78	35	103	18	128	20
29	3	54	30	79	15	104	15	129	1
30	3	55	18	80	19	105	6	130	33
31	6	56	12	81	24	106	3	131	42
32	3	57	27	82	33	107	9	132	9
33	6	58	19	83	9	108	15	133	12
34	6	59	9	84	24	109	12	134	37
35	3	60	12	85	21	110	9	135	15
36	18	61	20	86	15	111	3	136	3
37	9	62	48	87	30	112	12	137	12
38	5	63	24	88	23	113	53	138	41
39	6	64	24	89	21	114	37	139	48
40	12	65	9	90	23	115	54	140	6

This sample size summary is applicable to figures 30 thru 33

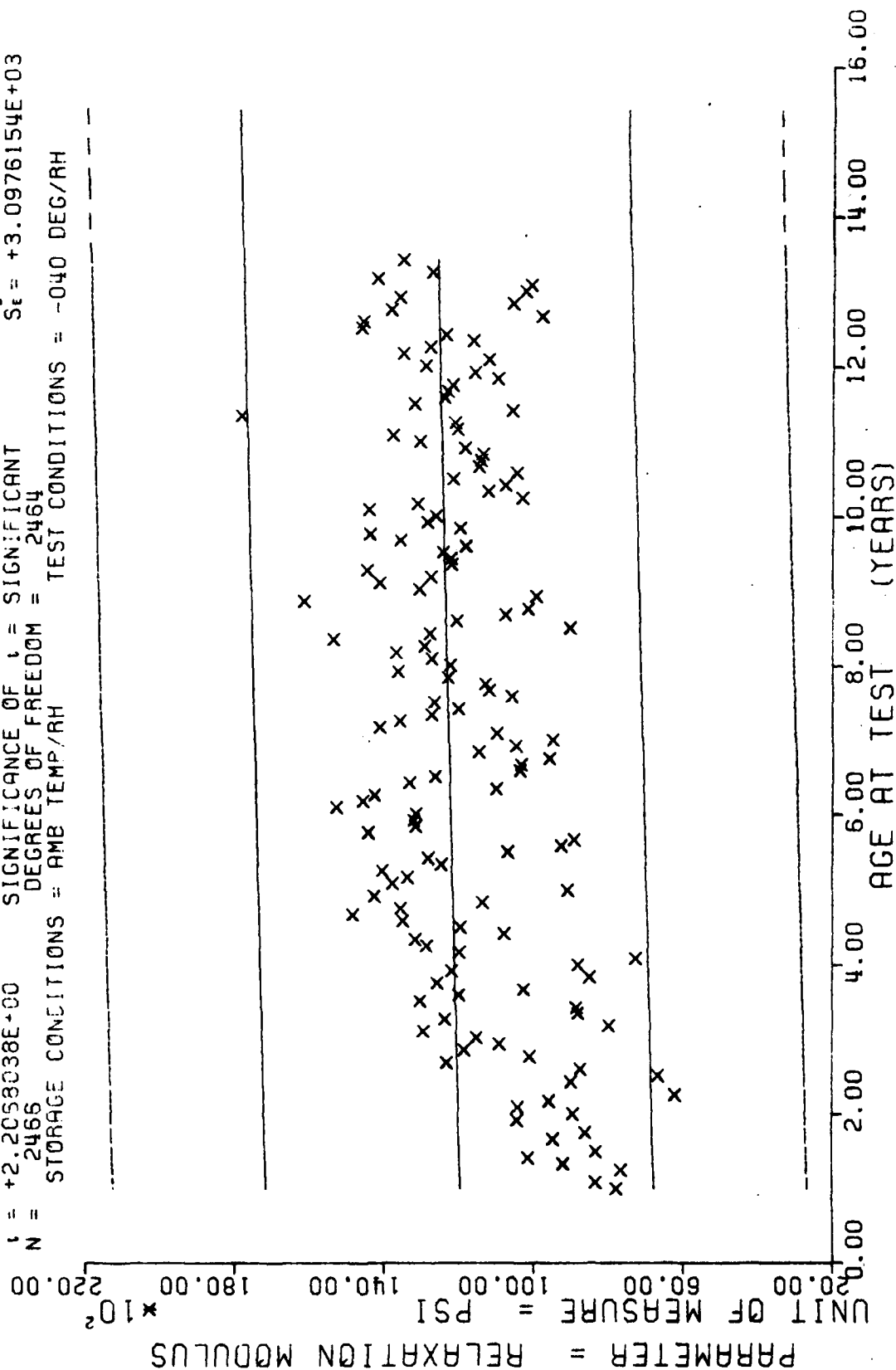
$F = +1.1382372E+01$
 $R = +6.9276601E-02$
 $t = +3.4470817E+00$
 $N = 2456$
 $Y = ((+1.6640687E+04) + (19.5634412E+00) * X)$
 SIGNIFICANCE OF F = SIGNIF:CANT
 SIGNIFICANCE OF R = SIGNIF:CANT
 SIGNIFICANCE OF t = SIGNIF:CANT
 DEGREES OF FREEDOM = 2454
 STORAGE CONDITIONS = AMB TEMP/RH
 TEST CONDITIONS = -040 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 10 SEC. -40 DEG F, TPH-1011

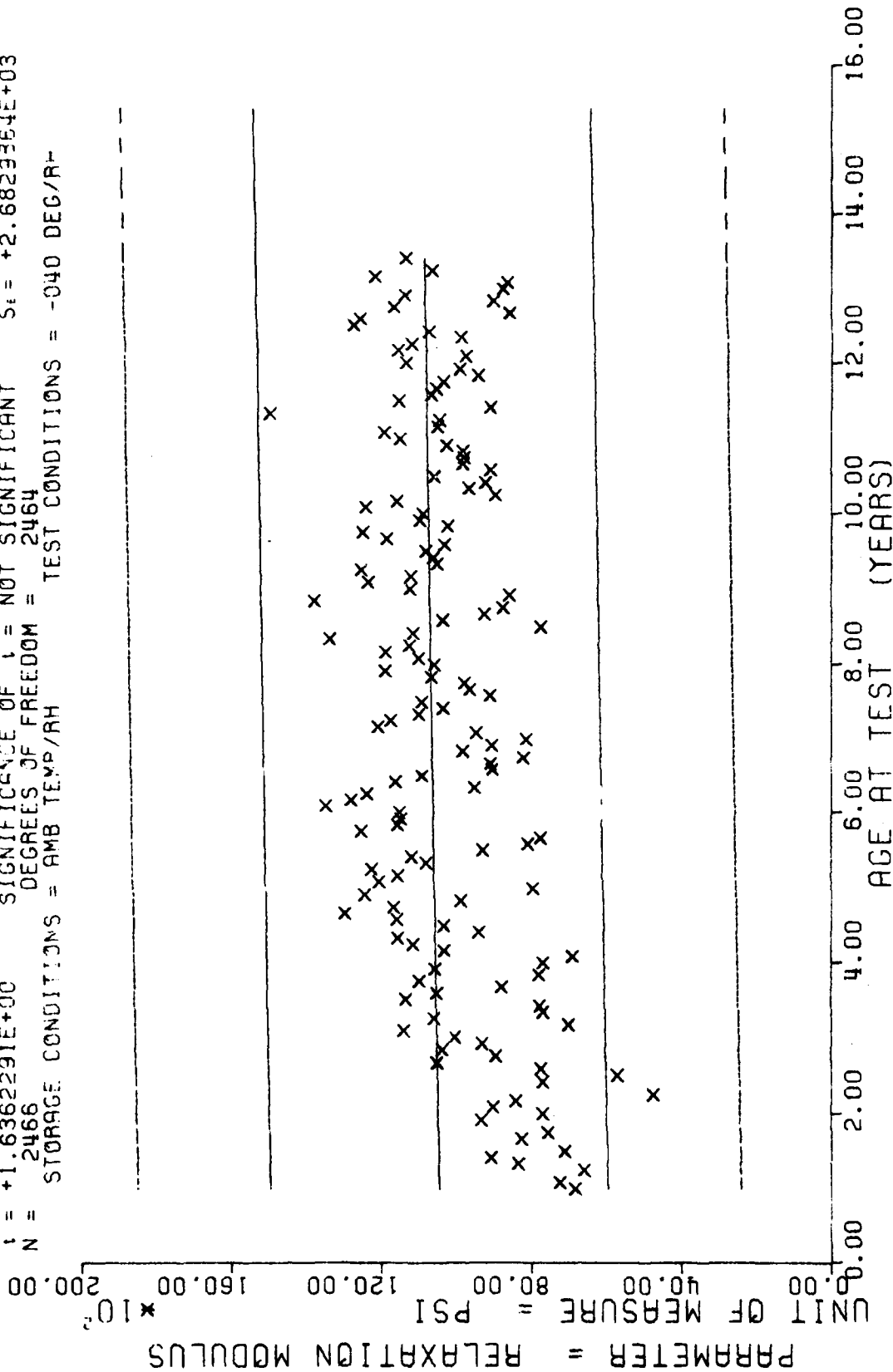
Figure 30

$\hat{Y} = ((+1.1907350E+04) + (+4.2582971E+00) * X)$
 F = +4.8593331E+00 SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +3.1000461E+03$
 R = +4.4413461E-02 SIGNIFICANCE OF R = SIGNIFICANT $S_0 = +1.9296219E+00$
 t = +2.2058038E+00 SIGNIFICANCE OF t = SIGNIFICANT $S_e = +3.0976154E+03$
 N = 2466 DEGREES OF FREEDOM = 2464
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -040 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 50 SEC, -40 DEG F, TPH-1011

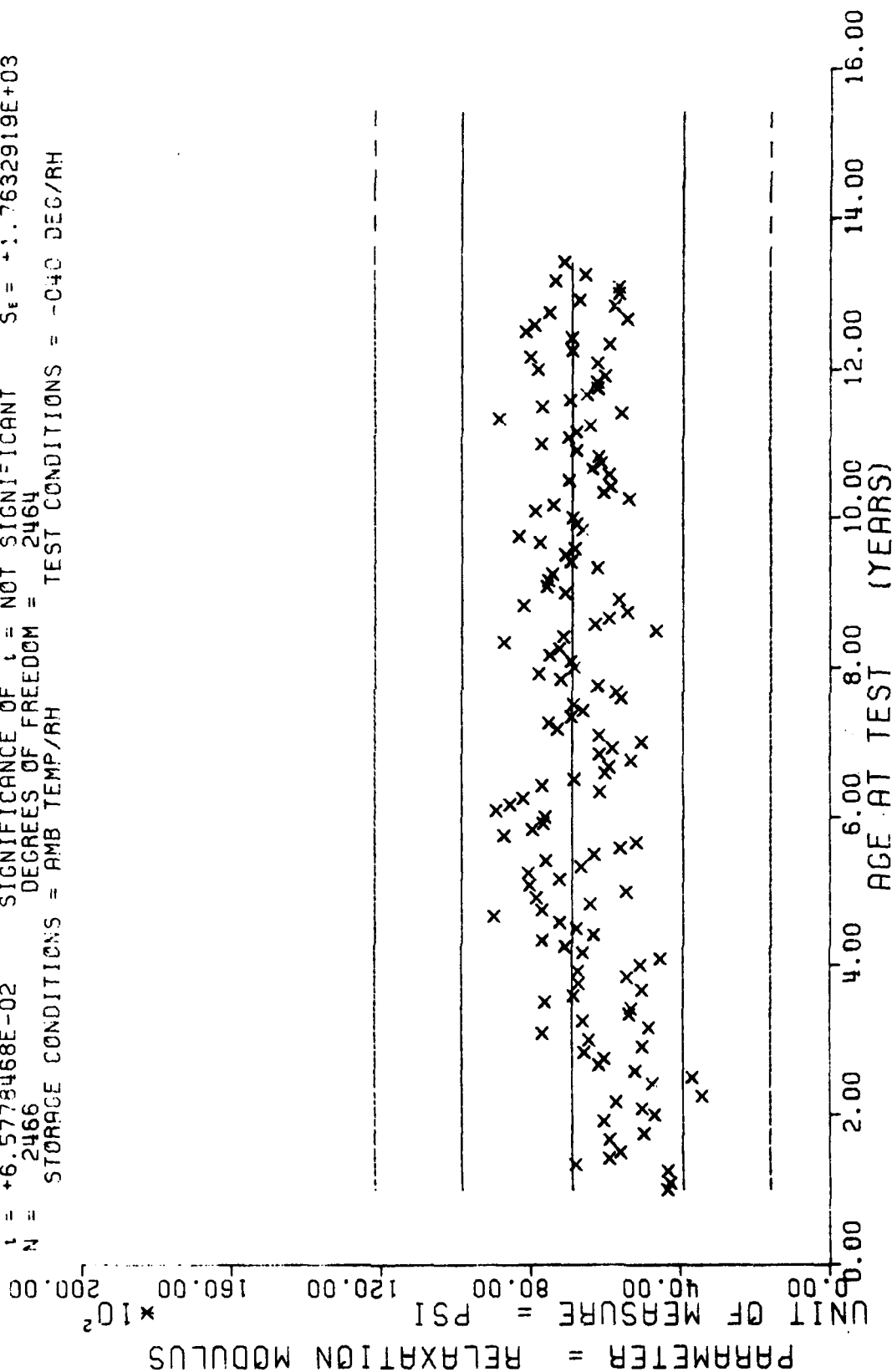
$Y = (1 + 1.0423298E+04) + (12.7346851E+00) * X$
 F = +2.6772458E+00 SIGNIFICANCE OF F = NOT SIGNIFICANT $G = +2.6833932E+03$
 R = +3.2944882E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT $S_a = +1.6712338E+00$
 t = +1.6362291E+00 SIGNIFICANCE OF t = NOT SIGNIFICANT $S_e = +2.6823364E+03$
 N = 2466 DEGREES OF FREEDOM = 2464
 STORAGE CONDITIONS = AMB TEMP/RAH TEST CONDITIONS = -040 DEG/RAH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 100 SEC, -40 DEG F, TPH-1011

Figure 32

$Y = ((+6.8853871E+03) + (+7.2252473E-02) * X$
 $F = +4.3268069E-03$ SIGNIFICANCE OF F = NOT SIGNIFICANT $G = -1.7629358E+03$
 $R = +1.3251438E-03$ SIGNIFICANCE OF R = NOT SIGNIFICANT $S_0 = +1.0984213E+00$
 $l = +6.5778468E-02$ SIGNIFICANCE OF l = NOT SIGNIFICANT $S_e = +1.7632919E+03$
 $N = 2466$ DEGREES OF FREEDOM = 2464
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -040 DEG/RH



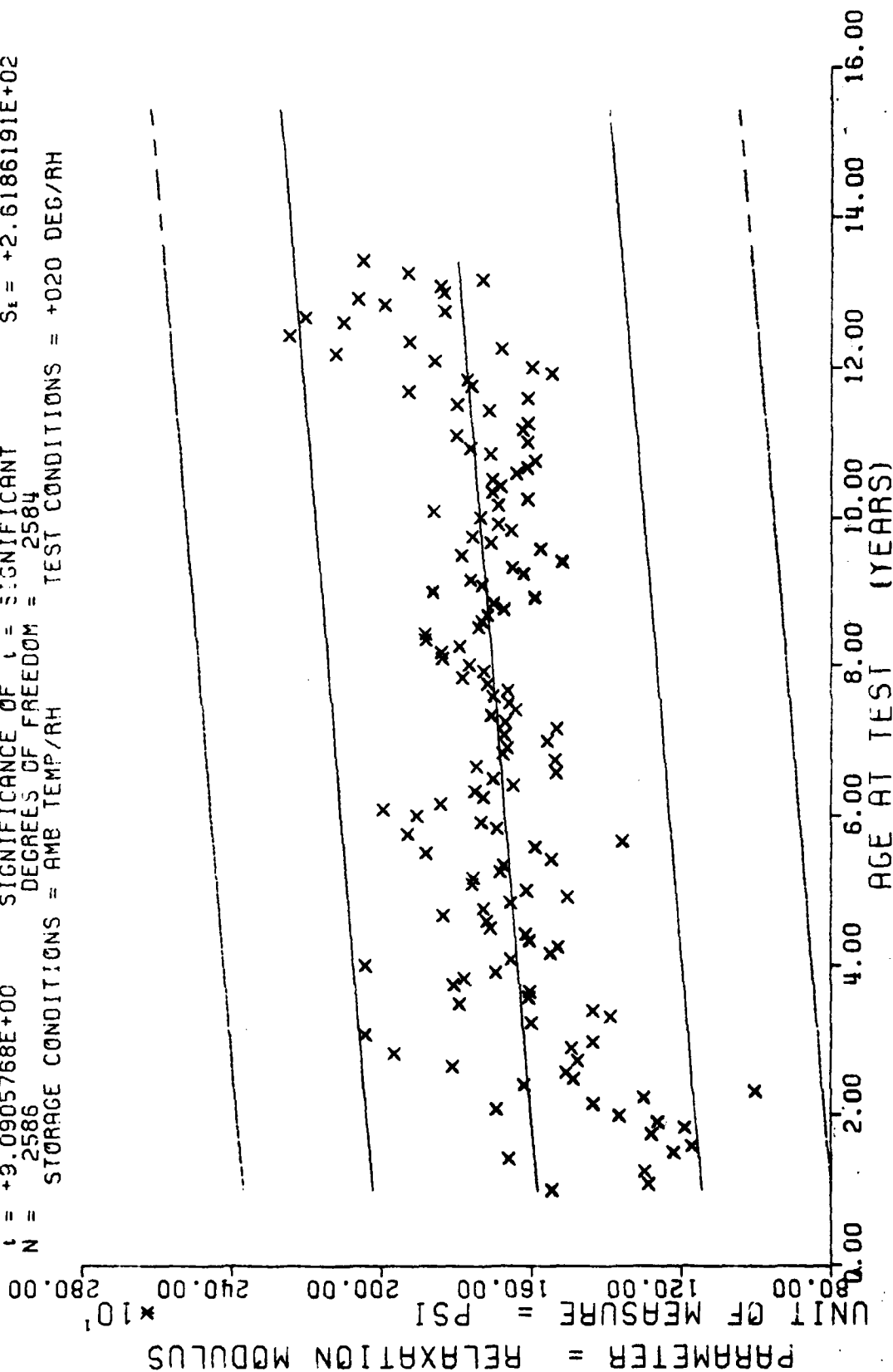
WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 1000 SEC, -40 DEG F, TPH-1011

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
12	3	41	3	66	3	91	18	116	45
13	3	42	15	67	10	92	21	117	21
14	9	43	3	68	3	93	18	118	21
17	7	44	3	69	24	94	18	119	27
16	3	45	6	70	24	95	29	120	27
13	3	46	5	71	46	96	54	121	21
21	3	47	3	72	42	97	57	122	6
22	3	48	3	73	24	98	51	123	9
23	8	49	6	74	33	99	36	124	23
24	8	50	27	75	38	100	21	125	18
25	9	51	39	76	26	101	24	126	20
25	6	52	48	77	37	102	8	127	11
27	8	53	15	78	36	103	18	128	24
26	3	54	32	79	13	104	9	129	3
29	3	55	18	80	24	105	6	130	33
30	3	56	13	81	39	106	3	131	45
31	9	57	30	82	27	107	12	132	15
32	3	58	16	83	16	108	15	133	6
33	12	59	6	84	27	109	9	134	36
34	3	60	22	85	12	110	9	135	15
35	3	61	21	86	21	111	3	137	12
36	24	62	43	87	26	112	27	138	26
37	3	63	24	88	24	113	47	139	63
39	12	64	27	89	24	114	41	140	6
40	8	65	12	90	30	115	42	141	12

WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 20 DEG F, TPH-1011

This sample size summary is applicable to figures 34 thru 37

$Y = ((+1.5672383E+03) - 1.4275745E+00) * X)$
 $F = +8.2638587E+01$ SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +2.6596479E+02$
 $R = +1.7603919E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_1 = +1.5703893E-01$
 $t = +9.0905768E+00$ SIGNIFICANCE OF t = SIGNIFICANT $S_2 = +2.6186191E+02$
 $N = 2586$ DEGREES OF FREEDOM = 2584
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +020 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 20 DEG F, TPH-1011

$F = +1.6471882E+02$ SIGNIFICANCE OF F = SIGNIFICANT $\sigma_1 = +1.5435076E+02$
 $R = +2.4479720E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_2 = +8.9765387E-02$
 $t = +1.2834283E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_1 = +1.4968349E+02$
 $N = 2586$ DEGREES OF FREEDOM = 2584
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +020 DEG/RH

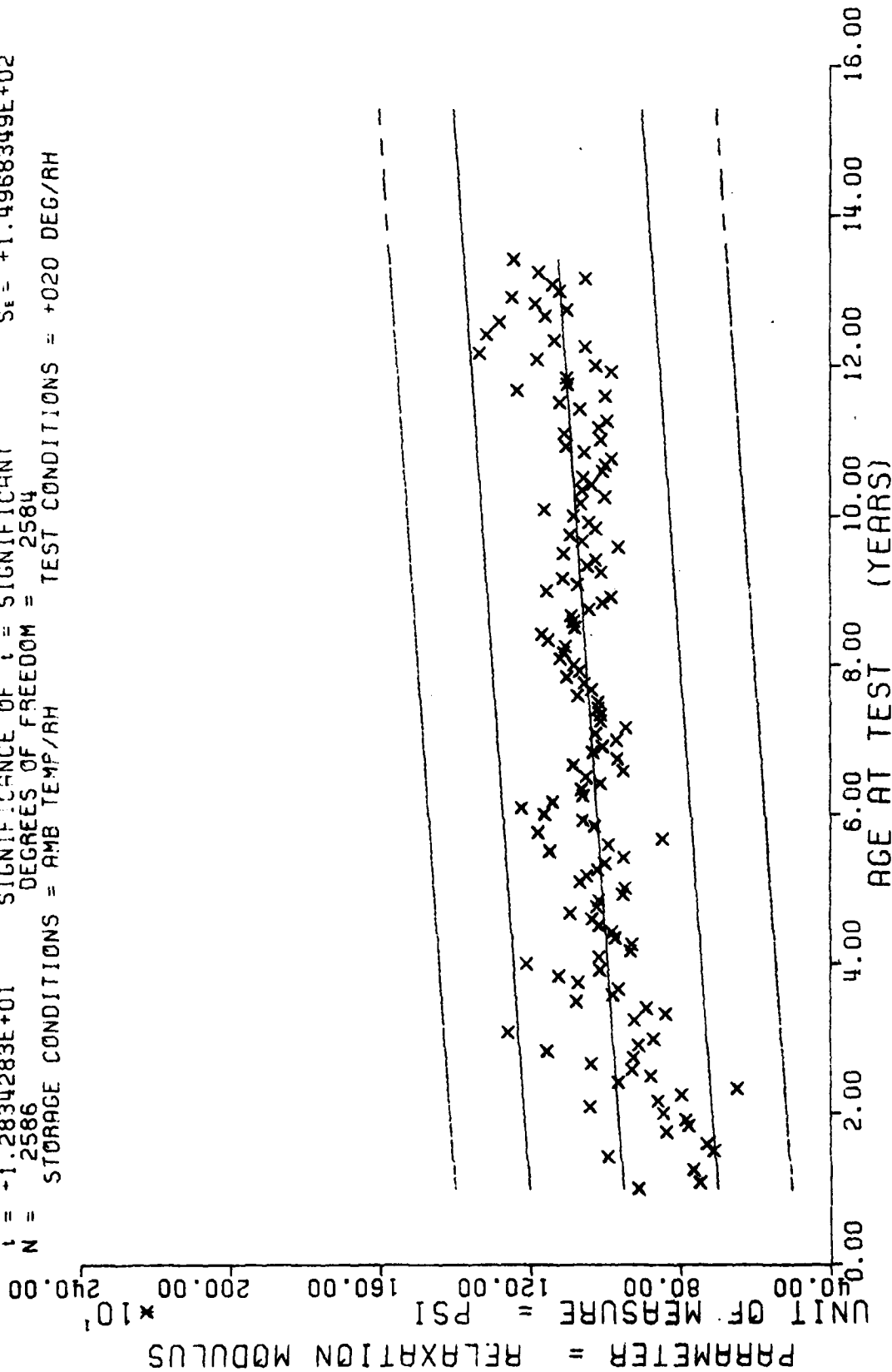
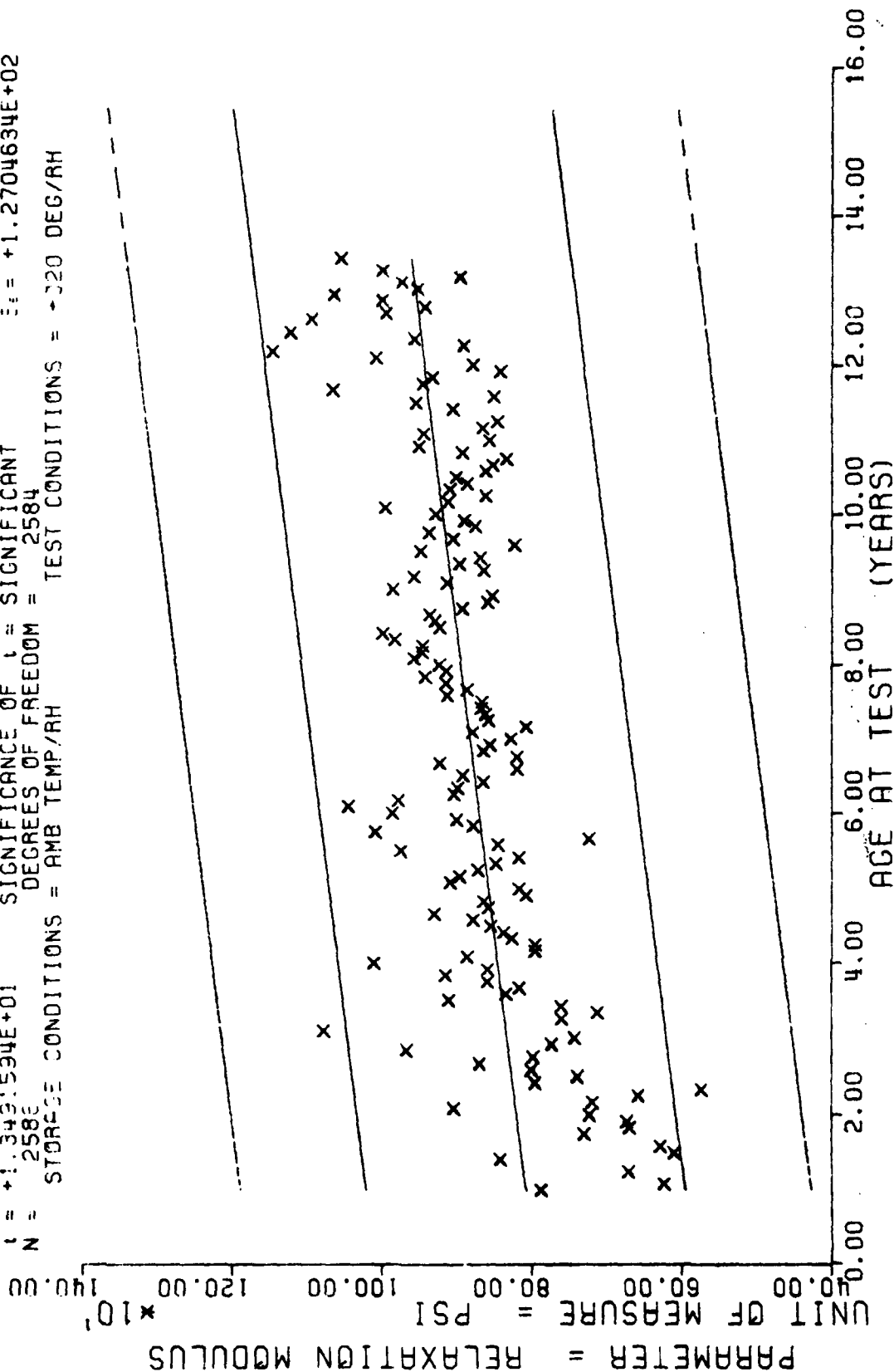


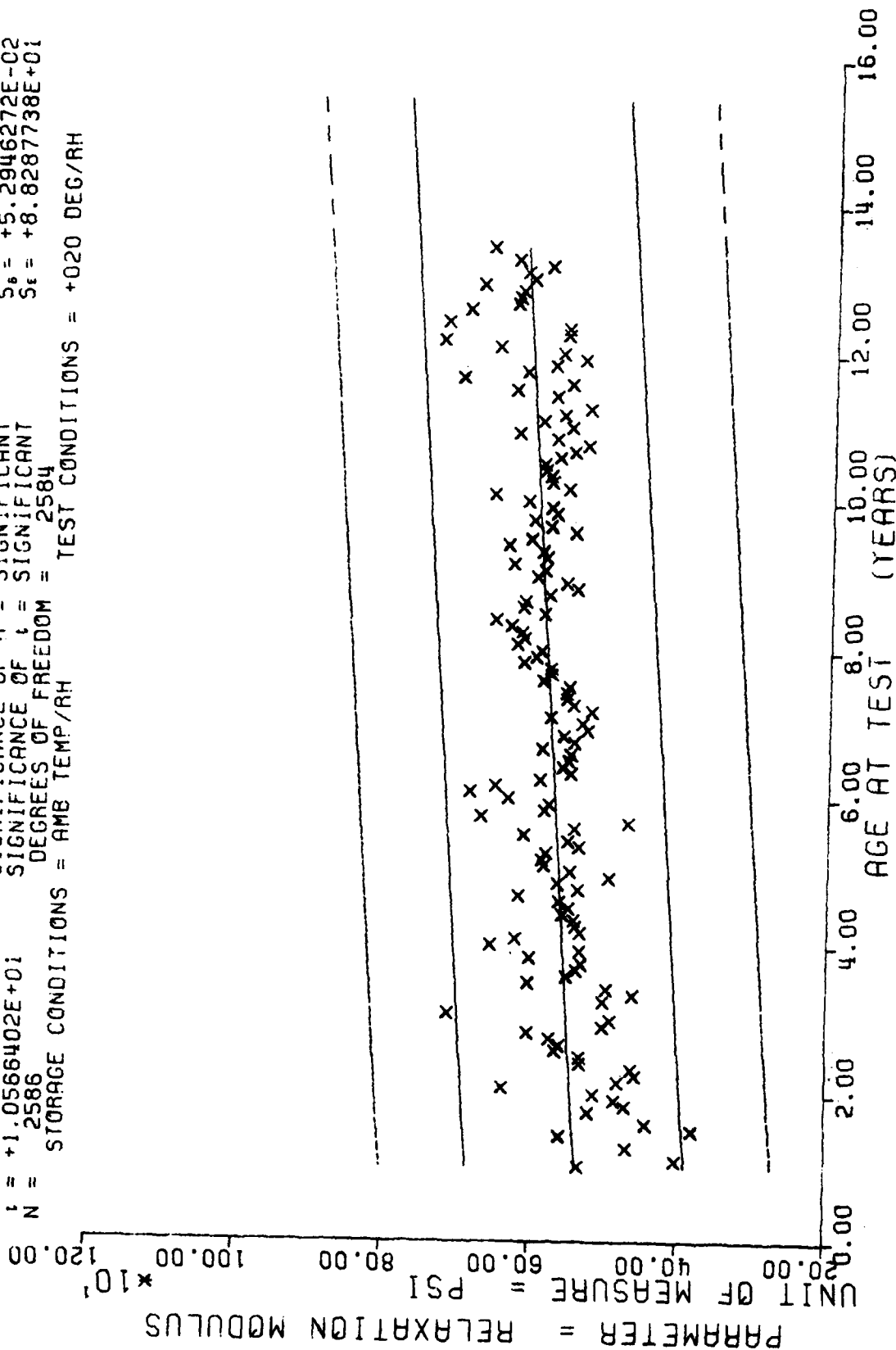
Figure 35

$Y = ((+7.9639796E+02) + (+1.0279226E+00) \cdot X)$
 F = +1.8202311E+02 SIGNIFICANCE OF F = SIGNIFICANT
 R = +2.5652935E-01 SIGNIFICANCE OF R = SIGNIFICANT
 t = +1.3431534E+01 SIGNIFICANCE OF t = SIGNIFICANT
 N = 258 DEGREES OF FREEDOM = 258
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -320 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 20 DEG F, TPH-1011

$F = +1.1164885E+02$
 $R = +2.0351455E-01$
 $t = +1.0566402E+01$
 $N = 2586$
 STORAGE CONDITIONS = AMB TEMP/RH
 $Y = ((+5.3047641E+02) + (+5.5945161E-01) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 2584
 TEST CONDITIONS = +020 DEG/RH
 $S_1 = +9.0157482E+01$
 $S_2 = +5.2946272E-02$
 $S_3 = +8.8287738E+01$



WING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 20 DEG F, TPH-1011

Figure 37

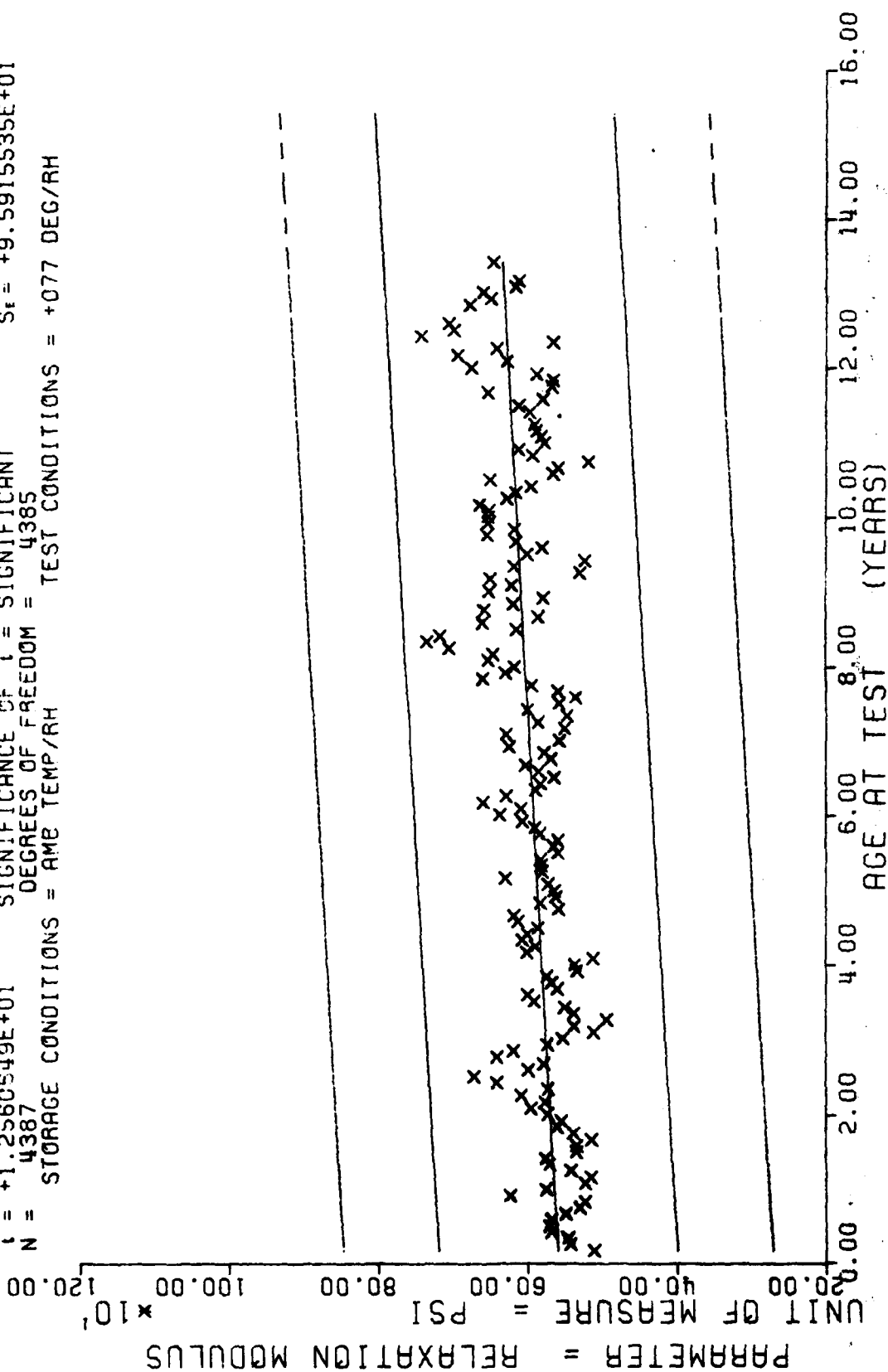
*** SAMPLE SIZE SUMMARY ***

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
2	3	27	24	32	72	77	33	102	15	127	15	127	15
3	6	28	27	53	10	78	39	103	23	128	24	128	24
4	18	29	48	54	34	79	21	104	12	129	3	129	3
5	22	30	43	55	22	80	21	105	3	130	42	130	42
6	21	31	30	56	36	81	45	106	3	131	54	131	54
7	35	32	60	57	51	82	21	107	10	132	14	132	14
8	30	33	25	58	45	83	15	108	21	133	9	133	9
9	45	34	51	59	30	84	21	109	9	134	33	134	33
10	38	35	36	60	50	85	15	110	9	135	15	135	15
11	37	36	58	61	51	86	21	111	6	136	12	136	12
12	55	37	18	62	74	87	36	112	21	137	45	137	45
13	51	38	24	63	57	88	21	113	56	138	45	138	45
14	46	39	42	64	51	89	30	114	44	139	9	139	9
15	57	40	18	65	36	90	36	115	24	140	12	140	12
16	36	41	24	66	35	91	11	116	65	141	21	141	21
17	46	42	12	67	35	92	23	117	18	142	27	142	27
18	13	43	9	68	51	93	19	118	21	143	3	143	3
19	10	44	5	69	75	94	15	119	21	144	3	144	3
20	4	45	6	70	99	95	30	120	33	145	6	145	6
21	27	46	18	71	62	96	54	121	15	146	9	146	9
22	9	47	30	72	51	97	69	122	6	147	3	147	3
23	6	48	36	73	33	98	51	123	9	148	3	148	3
24	34	49	42	74	48	99	39	124	24	149	6	149	6
25	27	50	30	75	39	100	20	125	18	150	6	150	6
26	30	51	82	76	27	101	31	126	22	151	9	151	9
										152	3	152	3
										153	3	153	3
										154	3	154	3
										155	6	155	6
										156	3	156	3
										157	3	157	3
										158	3	158	3
										159	3	159	3

WING 6-STRESS RELAXATION MODULUS,3.0% STRAIN,10 SEC. 77 DEG F.TPH-1011

This sample size summary is applicable to figures 38 thru 41

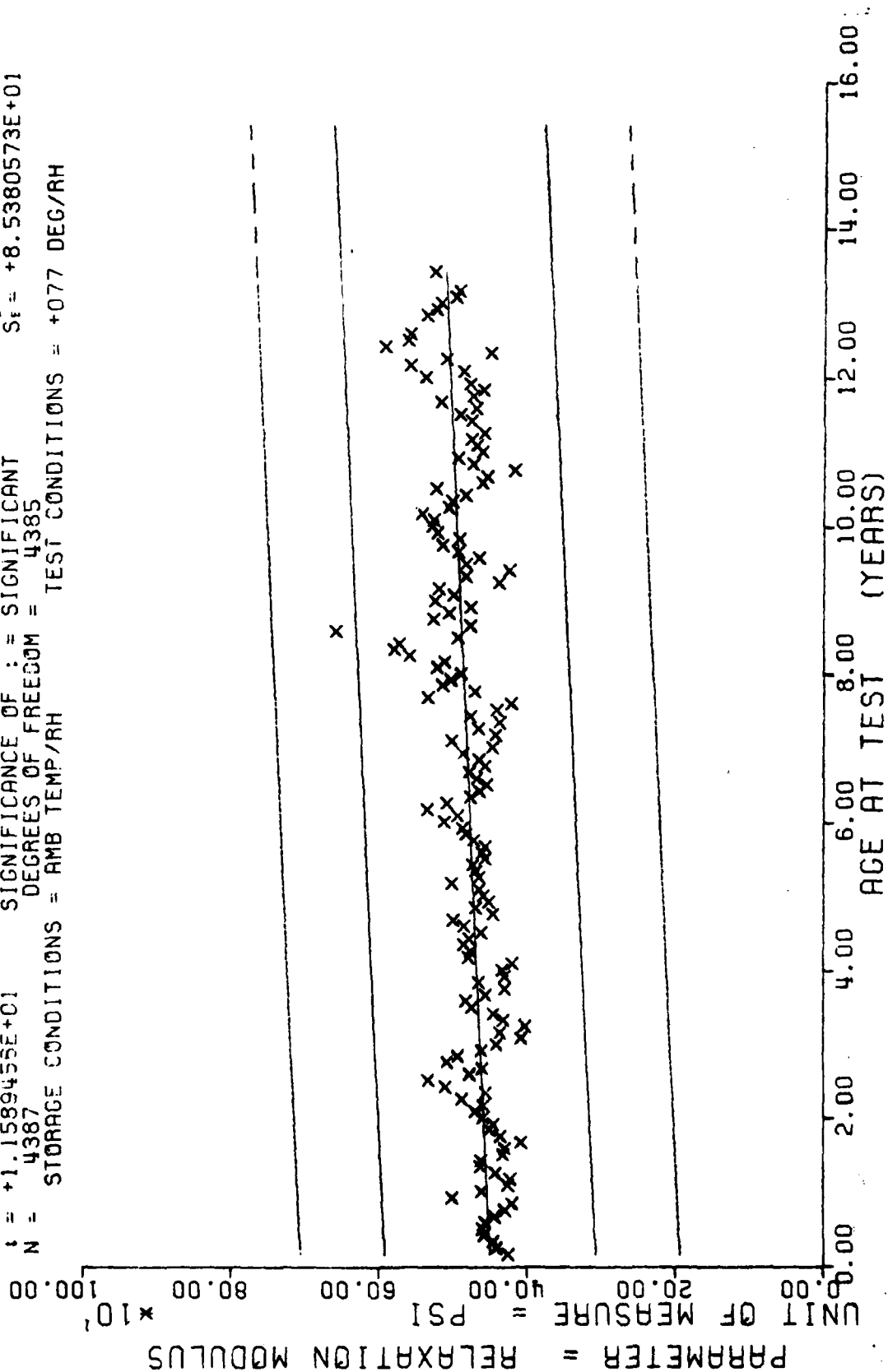
$Y = ((+5.5786608E+02) + (+4.6948906E-01) * X)$
 $F = +1.5776991E+02$ SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +9.7614652E+01$
 $R = +1.8635958E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_1 = +3.7377769E-02$
 $t = +1.2560949E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_2 = +9.5915535E+01$
 $N = 4387$ DEGREES OF FREEDOM = 4385
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +077 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 77 DEG F, TPH-1011

Figure 38

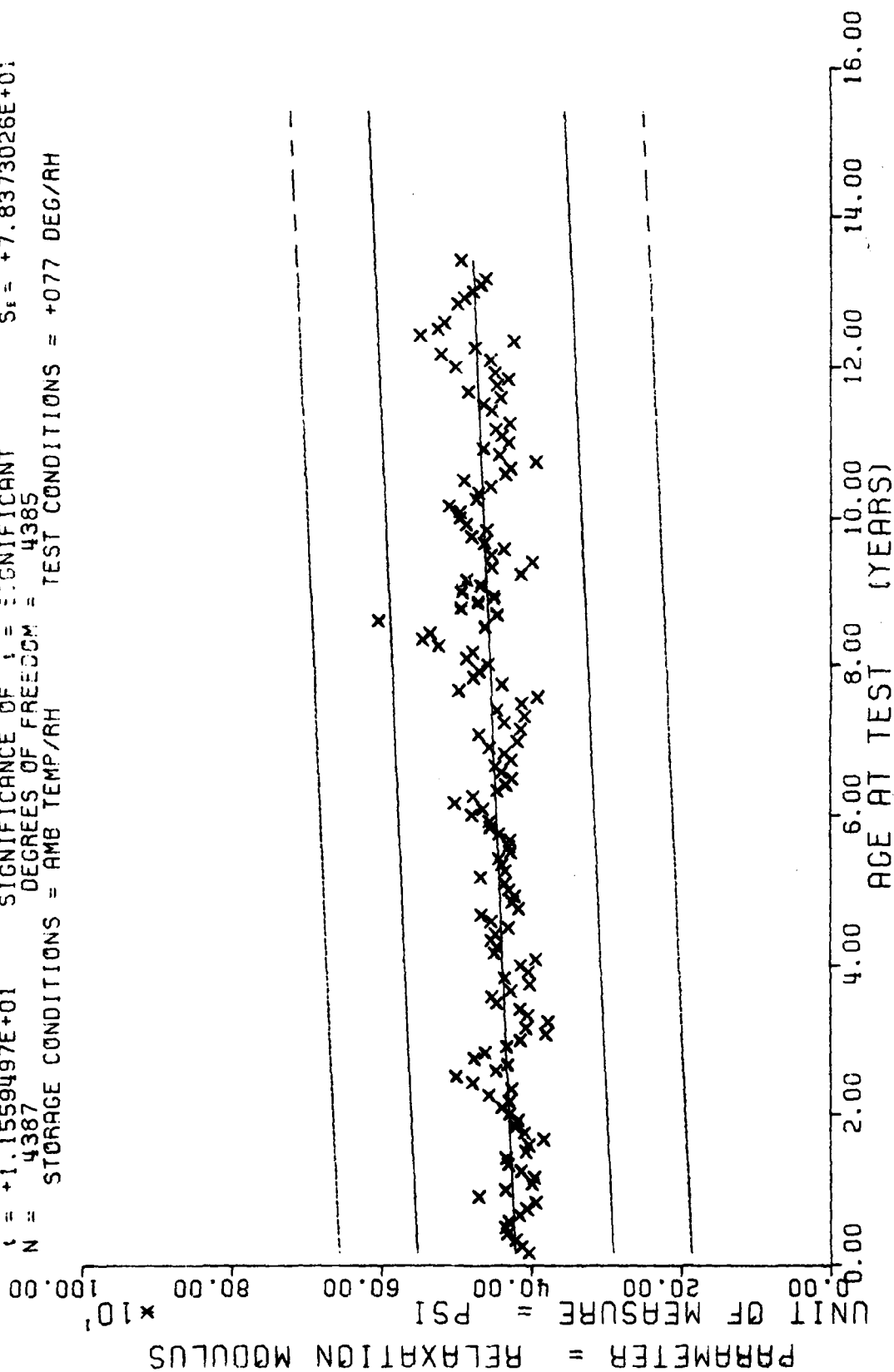
$F = +1.3431552E+02$
 $R = +1.7239532E-01$
 $t = +1.1589455E+01$
 $N = 4387$
 $Y = ((+4.4901430E+02) + (+3.8560847E-01) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 4385
 STORAGE CONDITIONS = AMB TEMP/RH
 TEST CONDITIONS = +077 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC. 77 DEG F, TPH-1011

Figure 39

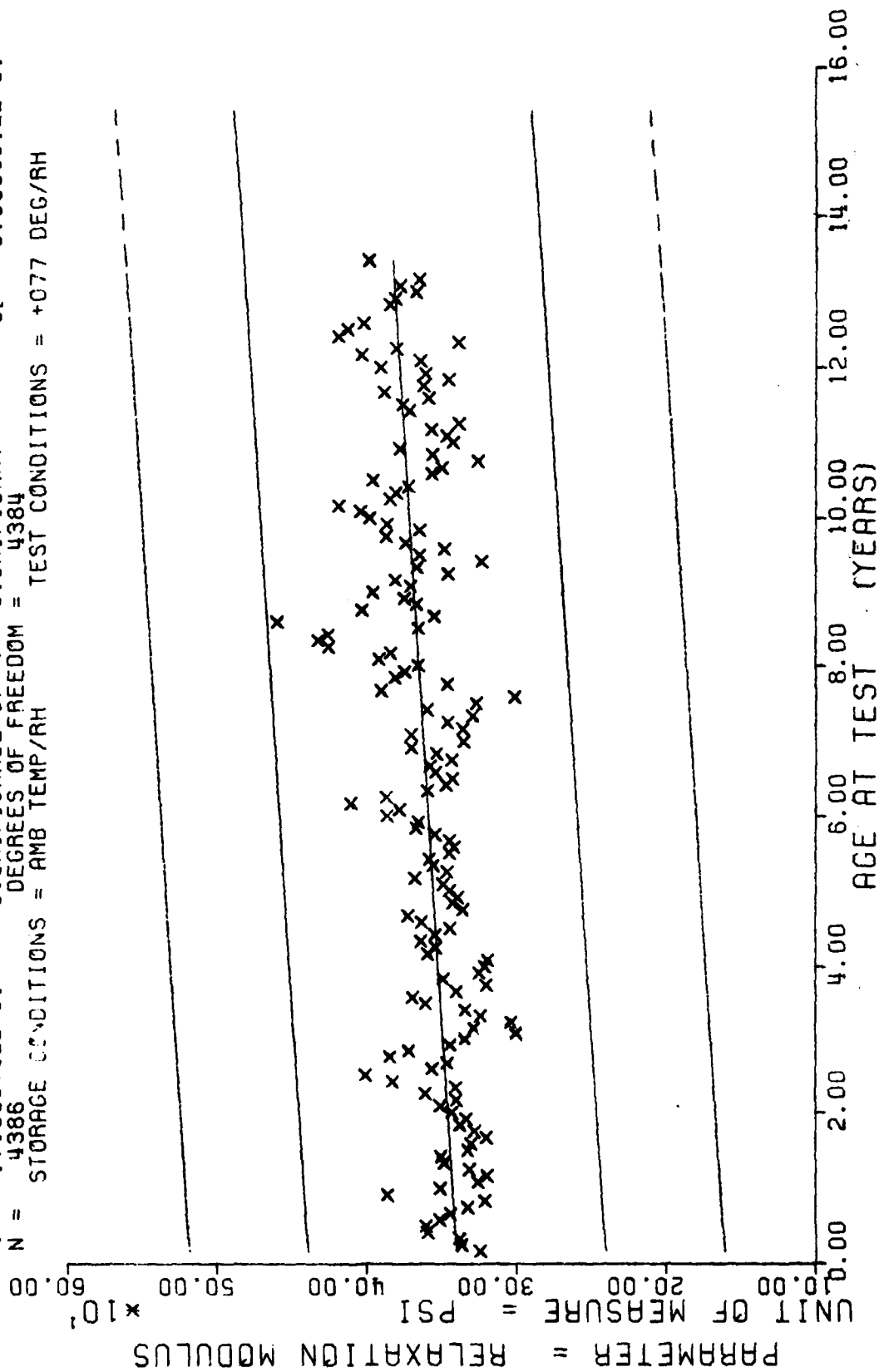
$F = +1.3362197E+02$ SIGNIFICANCE OF $F = +3.5304494E-01$ * X)
 $R = +1.7196336E-01$ SIGNIFICANCE OF $R =$
 $t = +1.1559497E+01$ SIGNIFICANCE OF $t =$
 $N = 4387$ DEGREES OF FREEDOM = 4385
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +077 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC. 77 DEG F, TPH-1011

Figure 40

$Y = ((+3.3918243E+02) + (+2.7085118E-01) * X)$
 F = +1.3597363E+02 SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +6.0513374E+01$
 R = +1.7344417E-01 SIGNIFICANCE OF R = SIGNIFICANT $S_0 = +2.3227531E-02$
 t = +1.1660782E+01 SIGNIFICANCE OF t = SIGNIFICANT $S_1 = +5.9603012E+01$
 N = 4386 DEGREES OF FREEDOM = 4384
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +077 DEG/RH

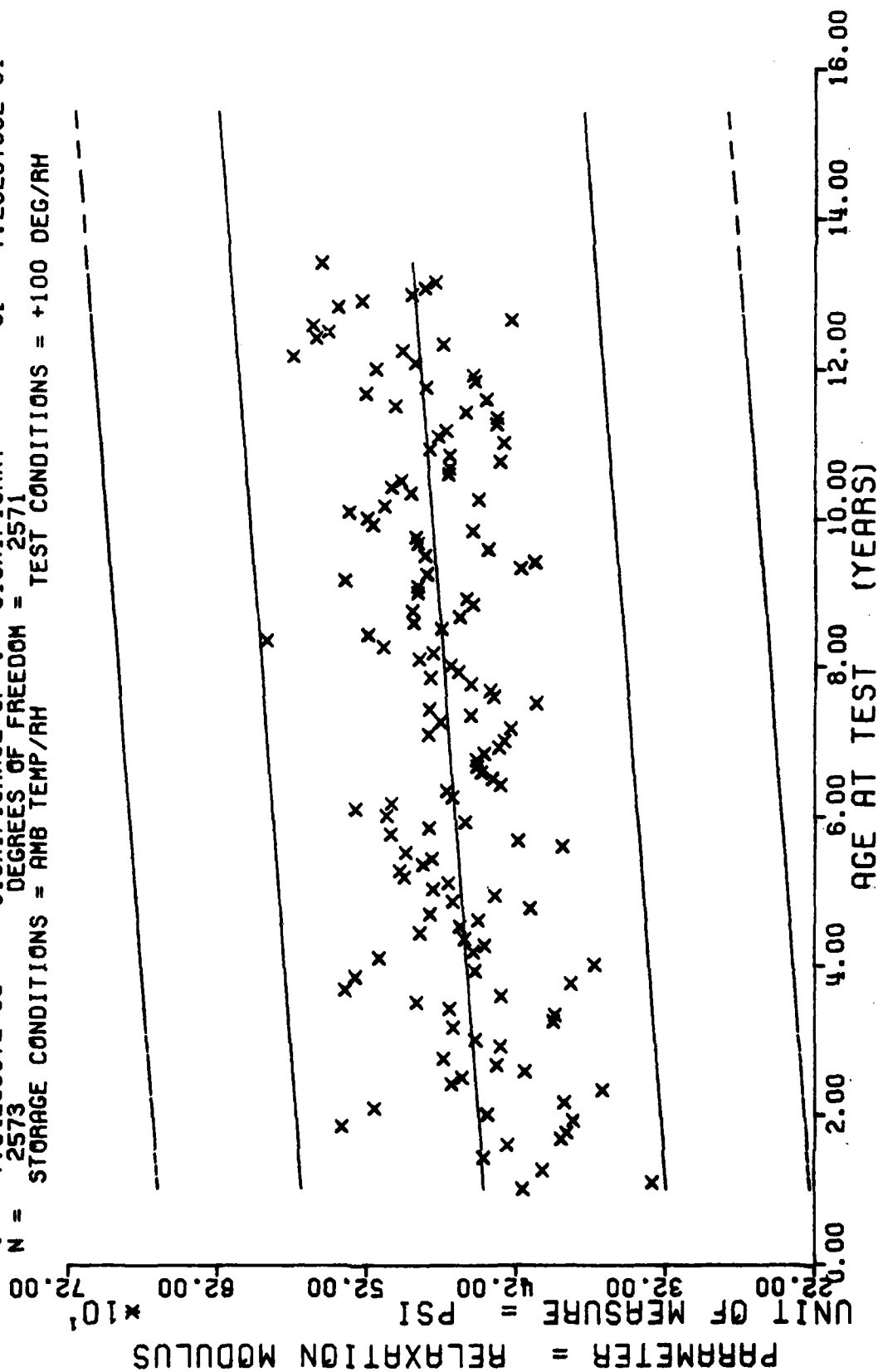


WING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 77 DEG F, TPH-1011

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
12	3	43	9	63	12	93	21	112	21
13	3	44	3	69	24	94	18	119	21
15	6	45	3	70	27	95	24	120	33
17	15	46	6	71	43	96	57	121	18
19	6	47	3	72	42	97	57	122	6
20	3	48	3	73	24	98	54	123	12
21	9	49	6	74	42	99	39	124	21
22	6	50	27	75	36	100	18	125	15
23	3	51	57	76	29	101	21	126	24
24	6	52	45	77	33	102	9	127	14
25	9	53	12	78	36	103	18	128	21
26	9	54	26	79	18	104	9	129	3
28	3	55	27	80	24	105	6	130	42
29	9	56	27	81	39	106	3	131	39
30	9	57	31	82	27	107	8	132	9
31	3	58	24	83	18	108	18	133	12
32	9	59	12	84	21	109	9	134	33
33	9	60	15	85	12	110	9	135	12
35	15	61	20	86	18	111	6	136	6
36	24	62	48	87	18	112	24	137	15
38	6	63	21	88	14	113	45	138	51
39	9	64	33	89	18	114	44	139	48
40	9	65	9	90	30	115	24	140	15
41	12	66	12	91	15	116	30	141	18
42	6	67	6	92	24	117	21	142	21

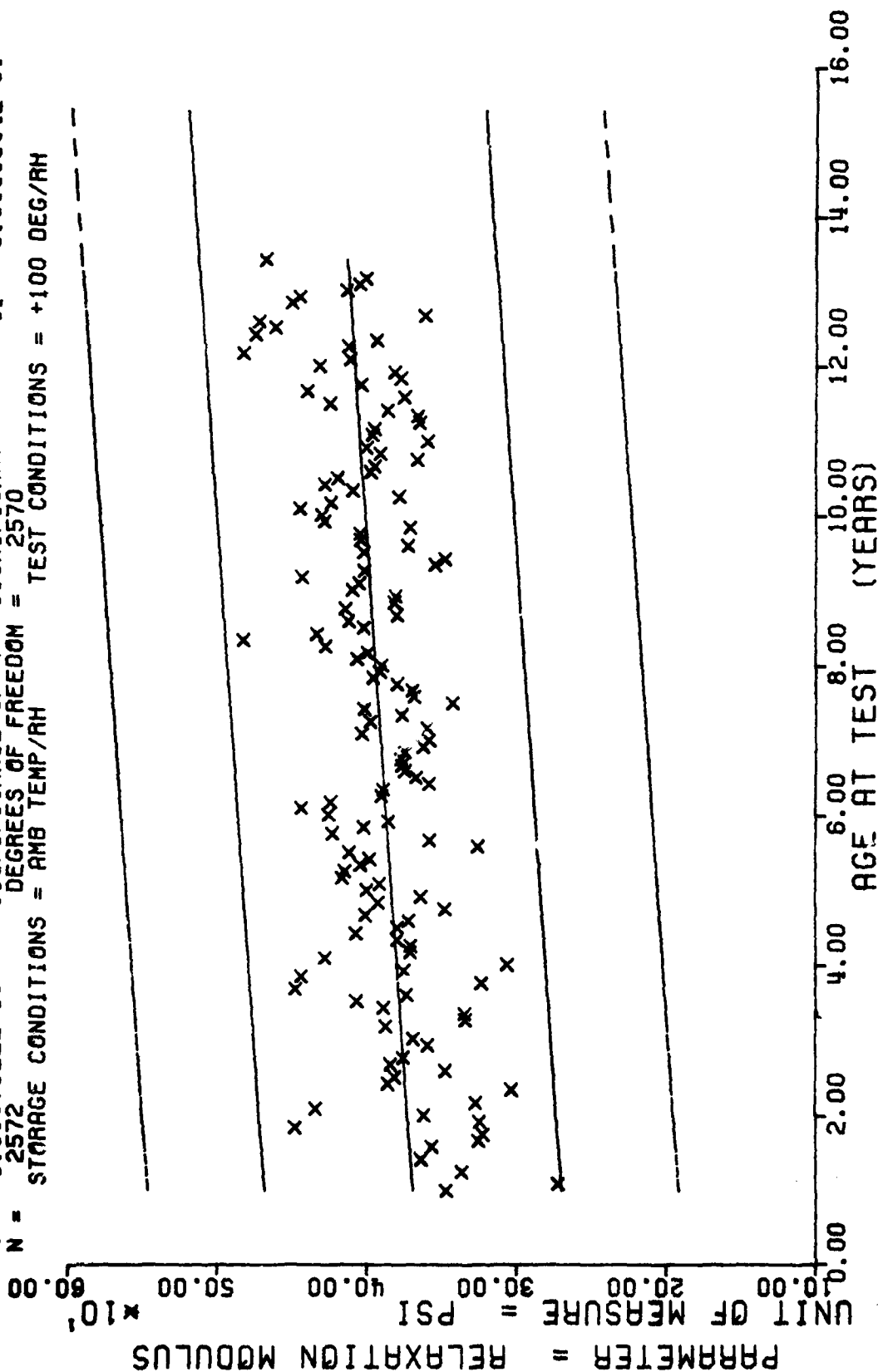
This sample size summary is applicable to figures 42 thru 45

$Y = ((+4.3725845E+02) + (+3.2435840E-01) * X)$
 $F = +5.6882574E+01$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +1.4712505E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +7.5420537E+00$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 2573$ DEGREES OF FREEDOM = 2571
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +100 DEG/RH

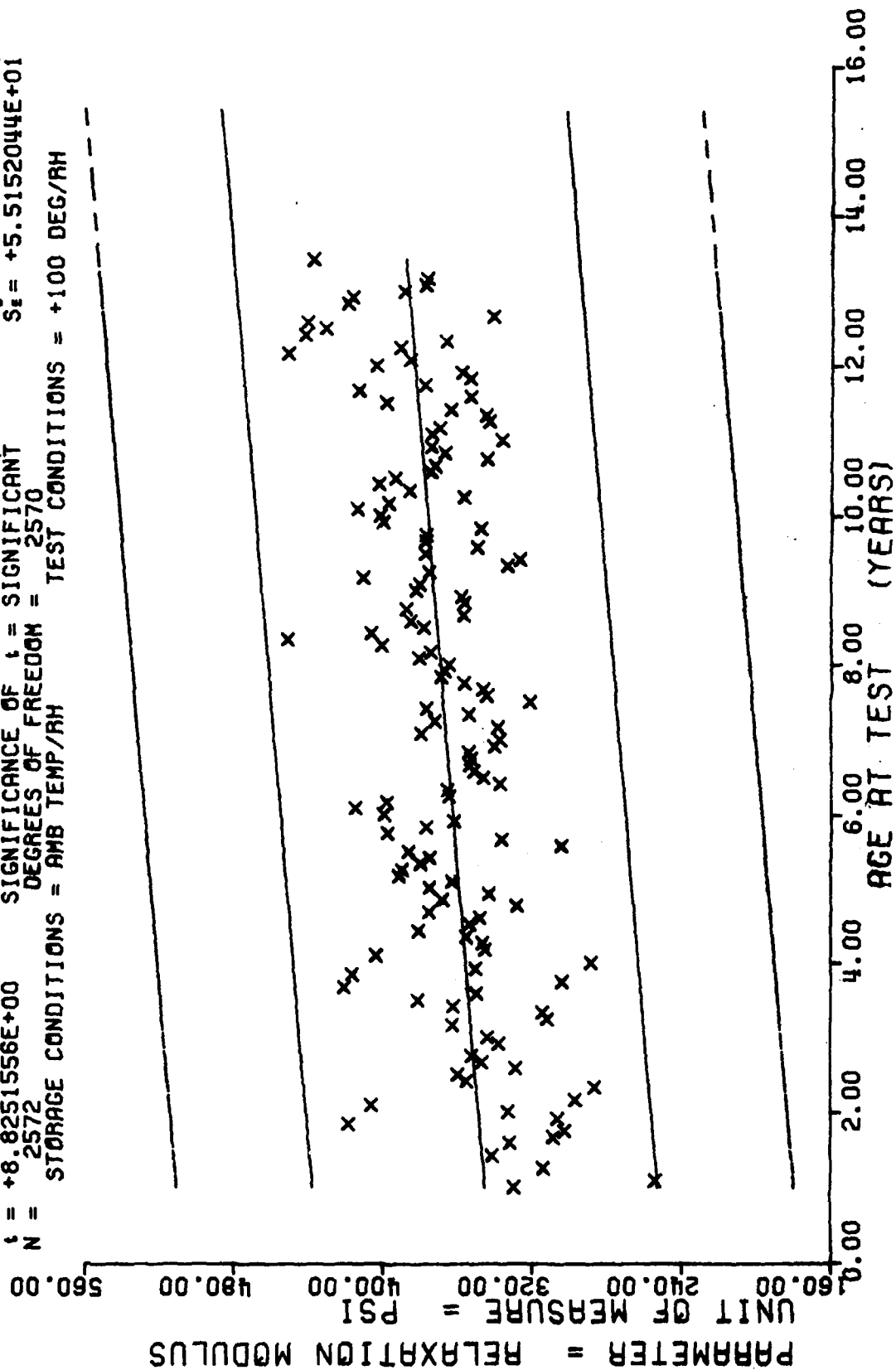


WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 100 DEG F, TPH-1011

$Y = ((+3.6549158E+02) + (+2.9305984E-01) * X)$
 $F = +7.0237510E+01$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +1.6310341E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +8.3807822E+00$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 2572$ DEGREES OF FREEDOM = 2570
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +100 DEG/RH

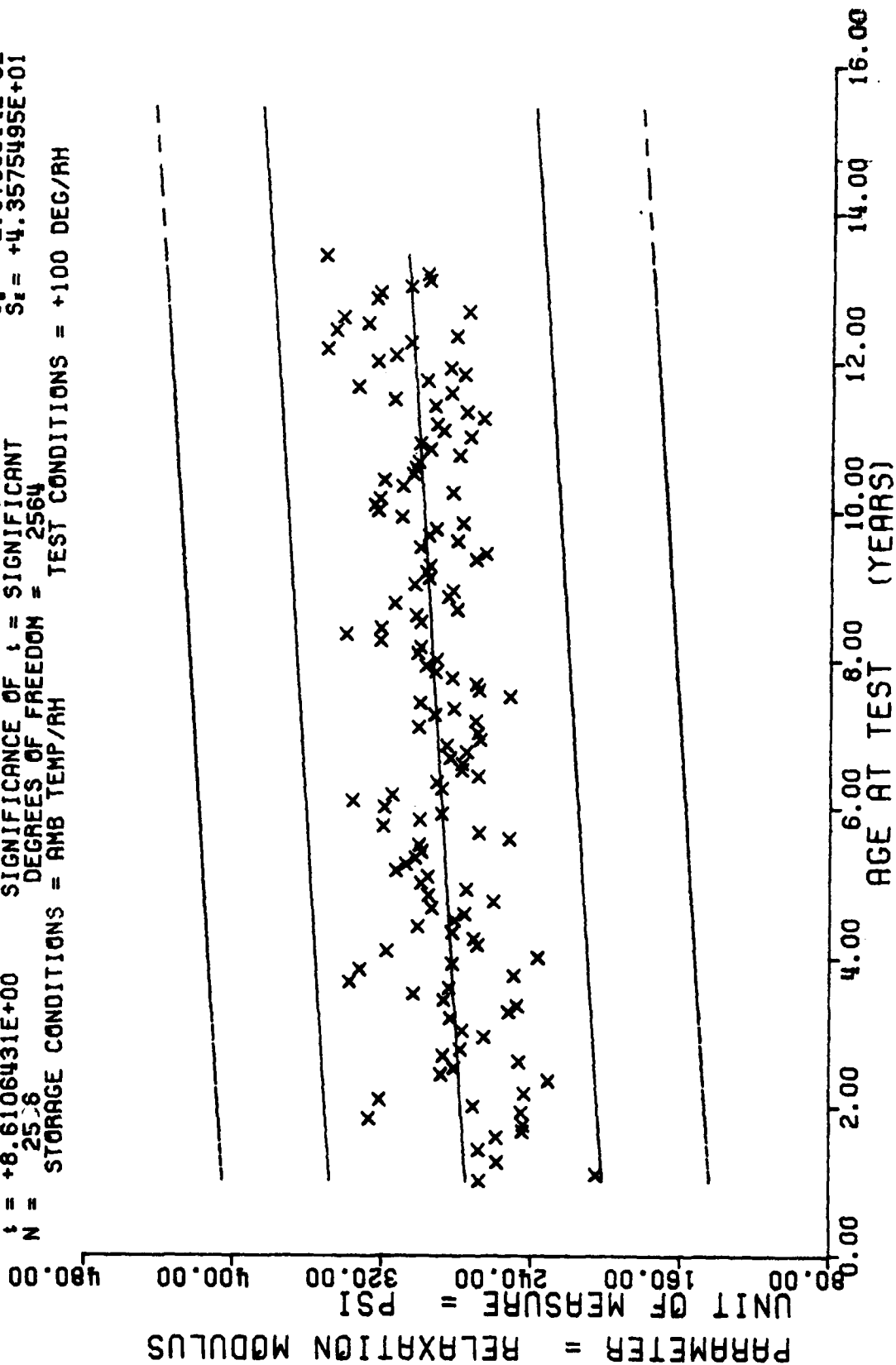


$Y = ((+3.4176551E+02) + (+2.8756094E-01) * X)$
 $F = +7.7883372E+01$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +1.7150348E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +8.8251556E+00$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 2572$ DEGREES OF FREEDOM = 2570
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +100 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 100 DEG F, TPH-1011

$Y = ((+2.7220652E+02) + (+2.2189553E-01) * X)$
 $F = +7.4143174E+01$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +1.6764338E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +8.6106431E+00$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 25.8$ DEGREES OF FREEDOM = 2564
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +100 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 100 DEG F, TPH-1011

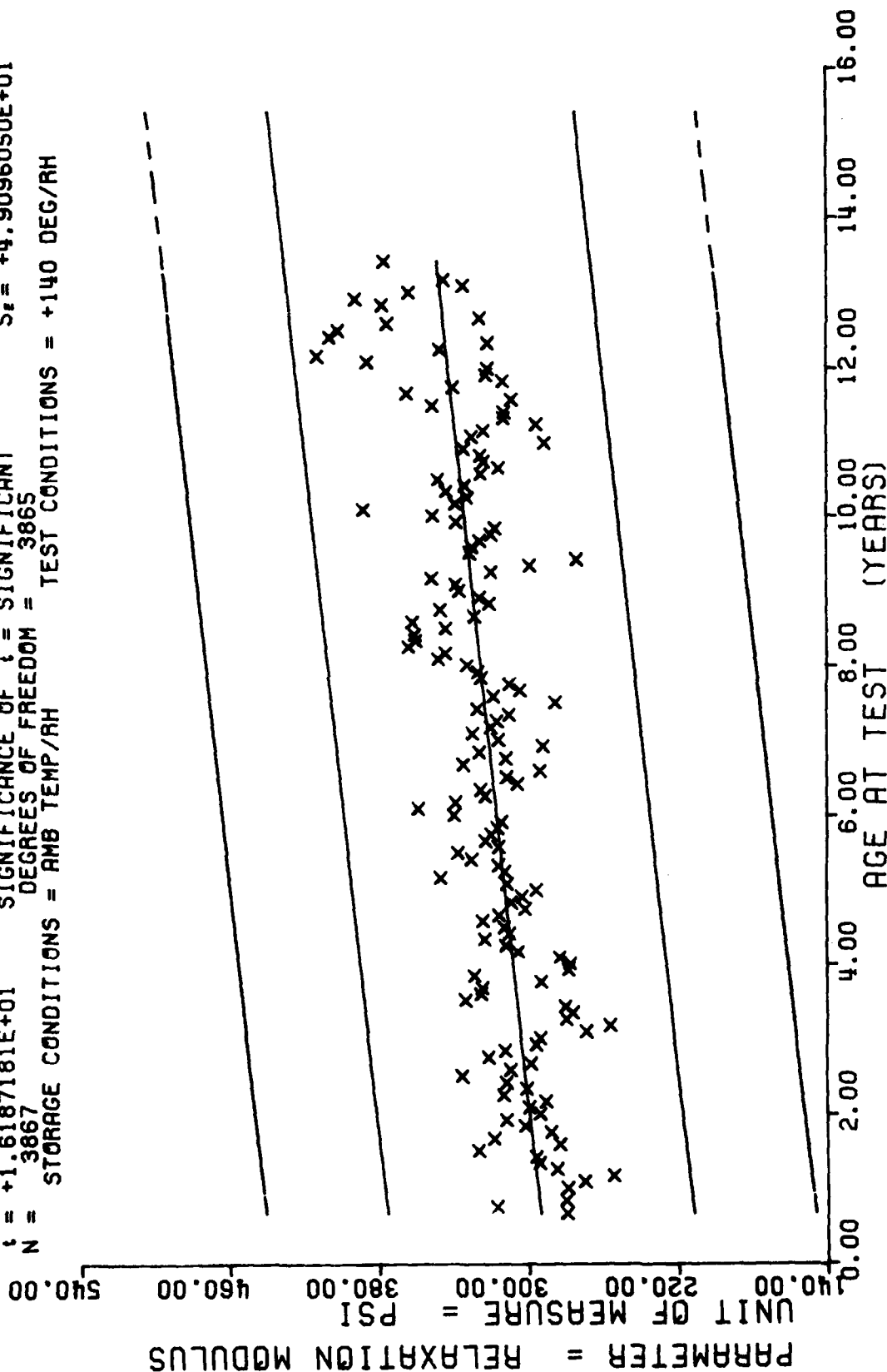
Figure 45

[illegible]

WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 140 DEG F, TPT-1011

This sample size summary is applicable to figures 46 thru 49

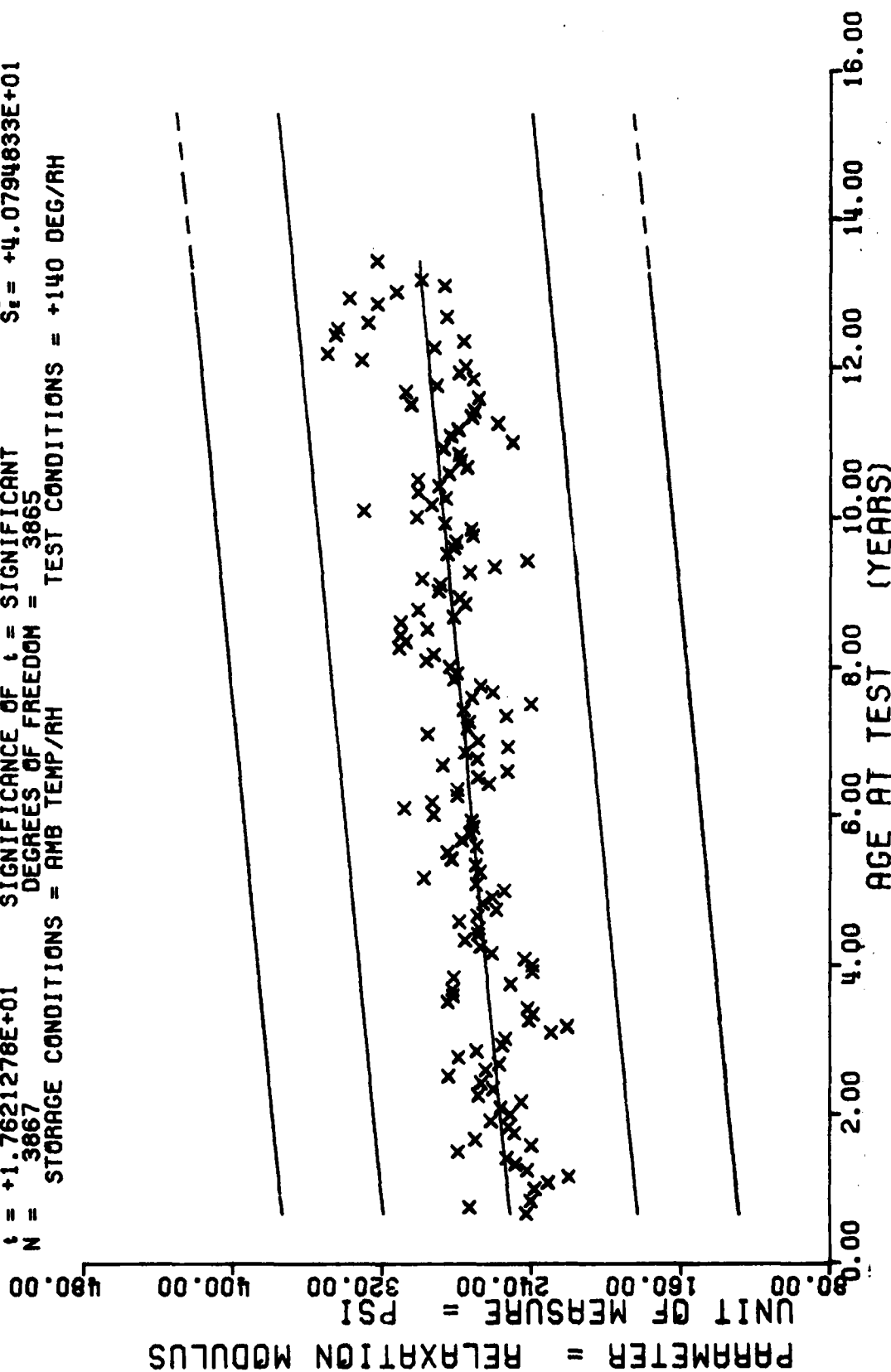
$Y = ((+2.9096799E+02) + (+3.5511494E-01) * X)$
 $F = +2.6202484E+02$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +2.5197223E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +1.6187181E+01$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 3867$ DEGREES OF FREEDOM = 3865
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +140 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 140 DEG F, TPH-1011

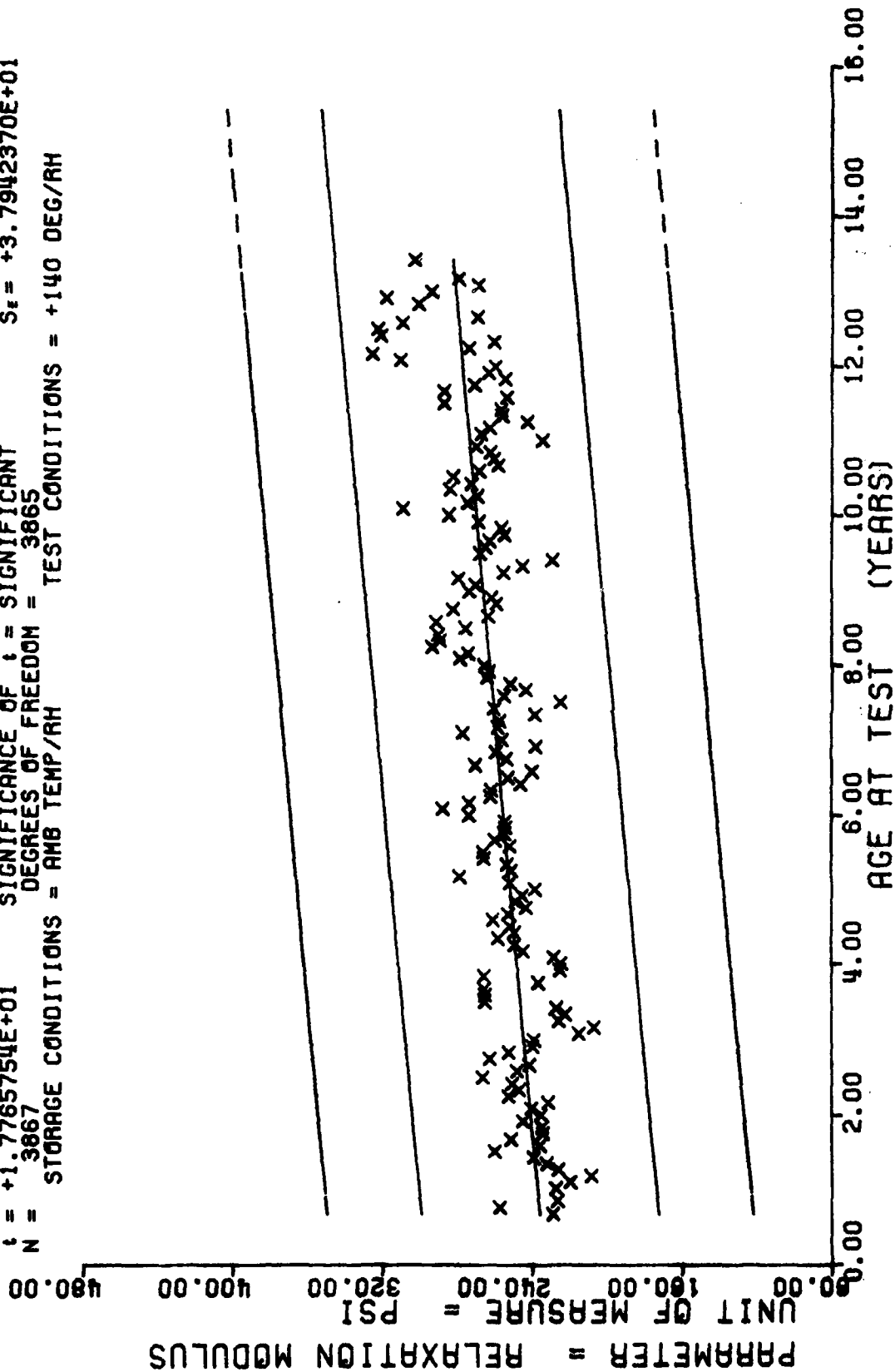
Figure 46

$Y = ((+2.4850989E+02) + (+3.2121346E-01) * X)$
 $F = +3.1050945E+02$ SIGNIFICANCE OF F = SIGNIFICANT $G = +4.2396399E+01$
 $R = +2.7269845E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S = +1.8228726E-02$
 $t = +1.7621278E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_t = +4.0794833E+01$
 $N = 3867$ DEGREES OF FREEDOM = 3865
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +140 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 140 DEG F, TPH-1011

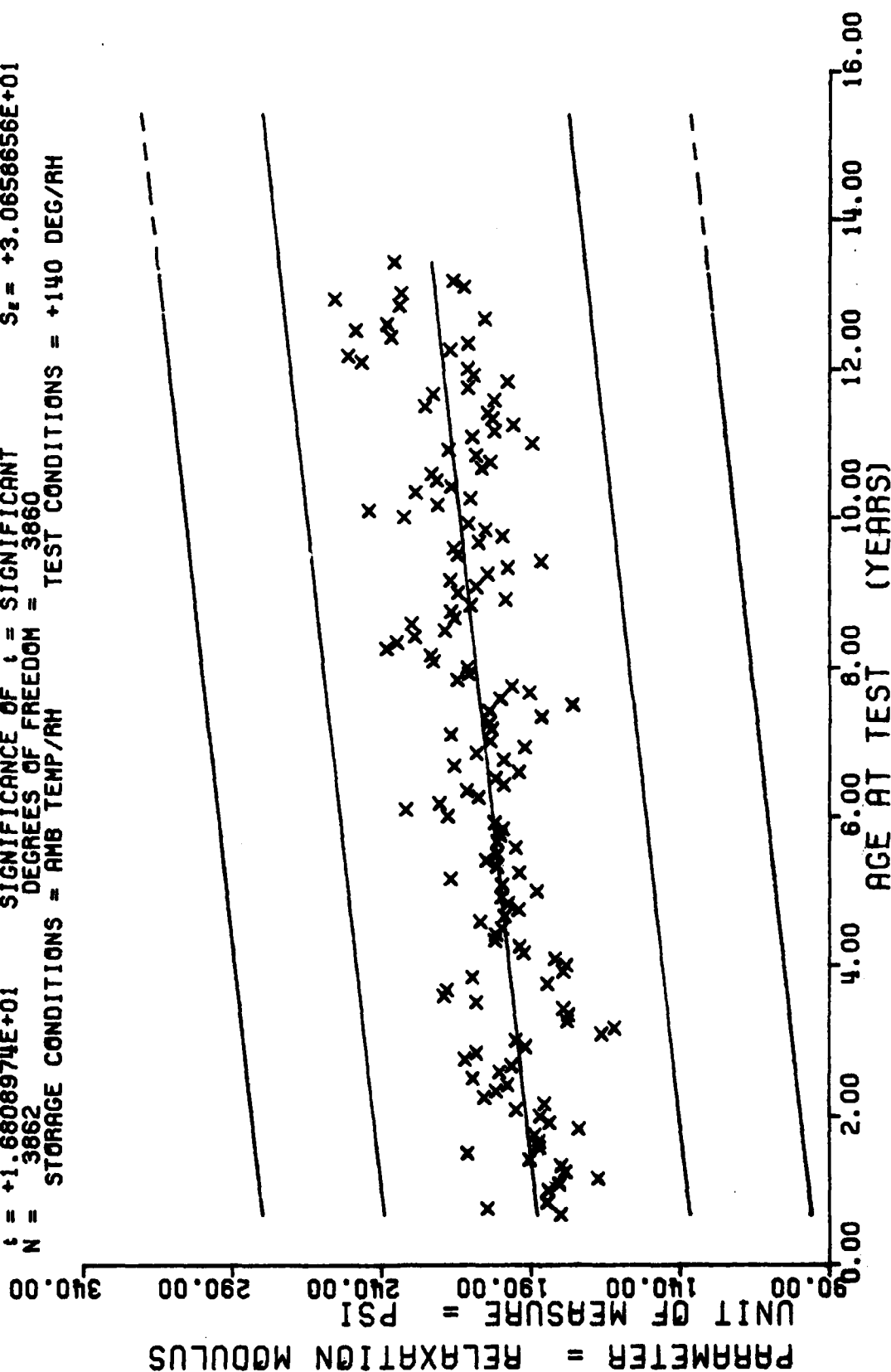
$Y = ((+2.3333437E+02) + (+3.0120298E-01) * X)$
 $F = +3.1562201E+02$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +2.7476612E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +1.7765754E+01$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 3867$ DEGREES OF FREEDOM = 3865
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +140 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 140 DEG F, TPH-1011

Figure 48

$Y = ((+1.8601608E+02) + ((+2.3034453E-01) * X)$
 $F = +2.8254163E+02$ SIGNIFICANCE OF F = SIGNIFICANT $G = +3.1756794E+01$
 $R = +2.6116067E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_0 = +1.3703663E-02$
 $t = +1.6808974E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_2 = +3.0658656E+01$
 $N = 3862$ DEGREES OF FREEDOM = 3860
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +140 DEG/RH



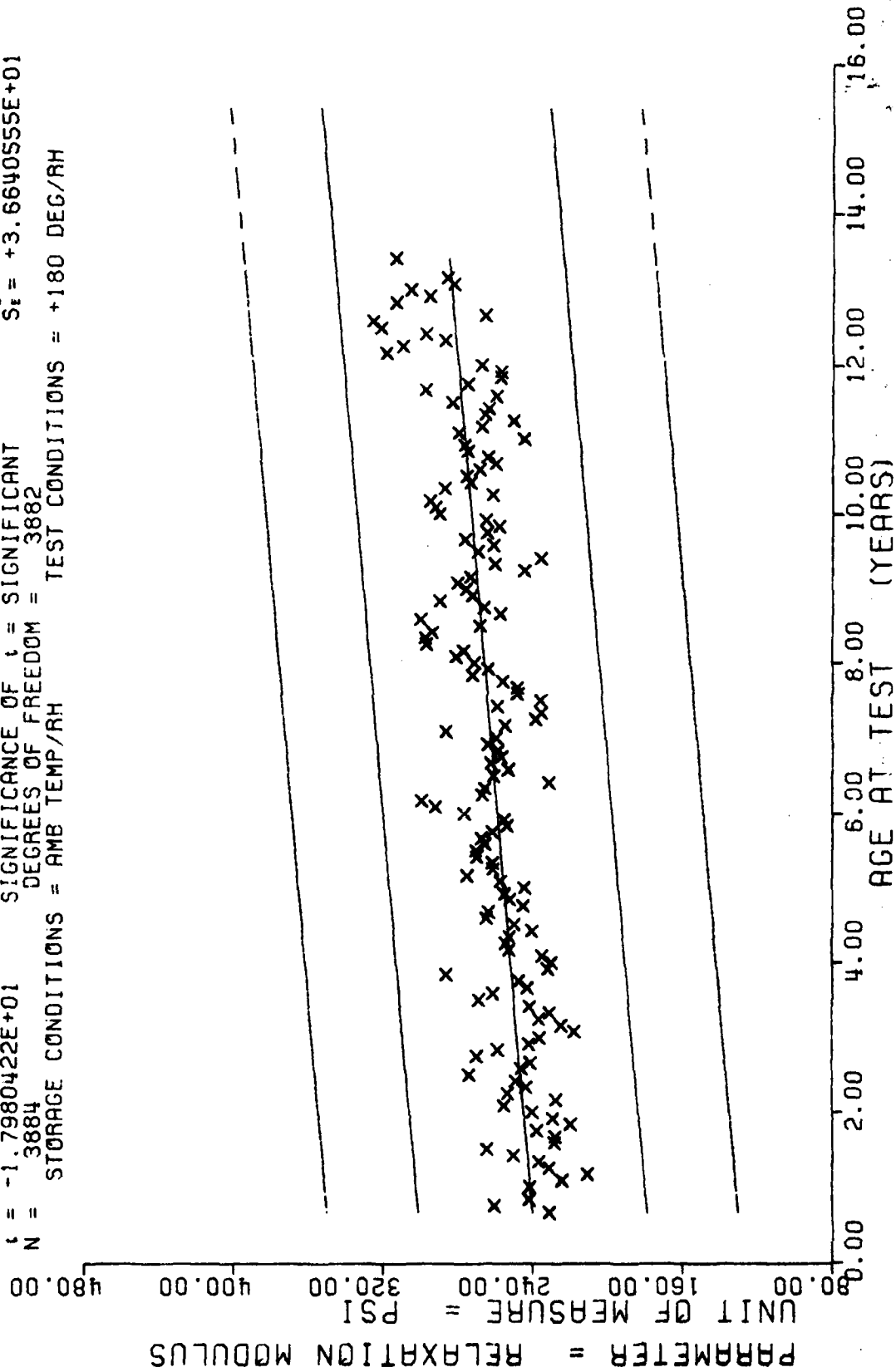
WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 140 DEG F, TPH-1011

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
8	3	34	51	59	33	34	24	109	9
9	3	35	55	60	43	65	9	110	9
10	3	36	57	61	54	66	21	111	3
11	24	37	21	62	67	67	27	112	27
12	24	38	18	63	69	68	30	113	48
13	12	39	46	64	51	69	30	114	41
14	24	40	12	65	50	70	33	115	18
15	18	41	21	66	39	91	18	116	33
16	33	42	12	67	30	92	18	117	21
17	18	43	3	68	51	93	24	118	20
18	9	44	6	69	76	94	20	119	15
19	6	45	6	70	80	95	21	120	29
20	18	46	6	71	45	96	60	121	12
21	3	47	30	72	60	97	57	122	6
22	9	48	42	73	38	98	54	123	12
23	30	49	42	74	36	99	39	124	21
24	35	50	36	75	36	100	20	125	15
25	24	51	57	76	39	101	18	126	24
26	24	52	66	77	27	102	9	127	14
27	26	53	27	78	42	103	18	128	15
28	50	54	33	79	16	104	6	129	6
29	42	55	33	80	24	105	9	130	30
30	33	56	42	81	36	106	3	131	45
31	54	57	54	82	27	107	6	132	12
32	30	58	57	83	16	108	24	133	12

RUNNING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC. 180 DEG F, TPR-1011

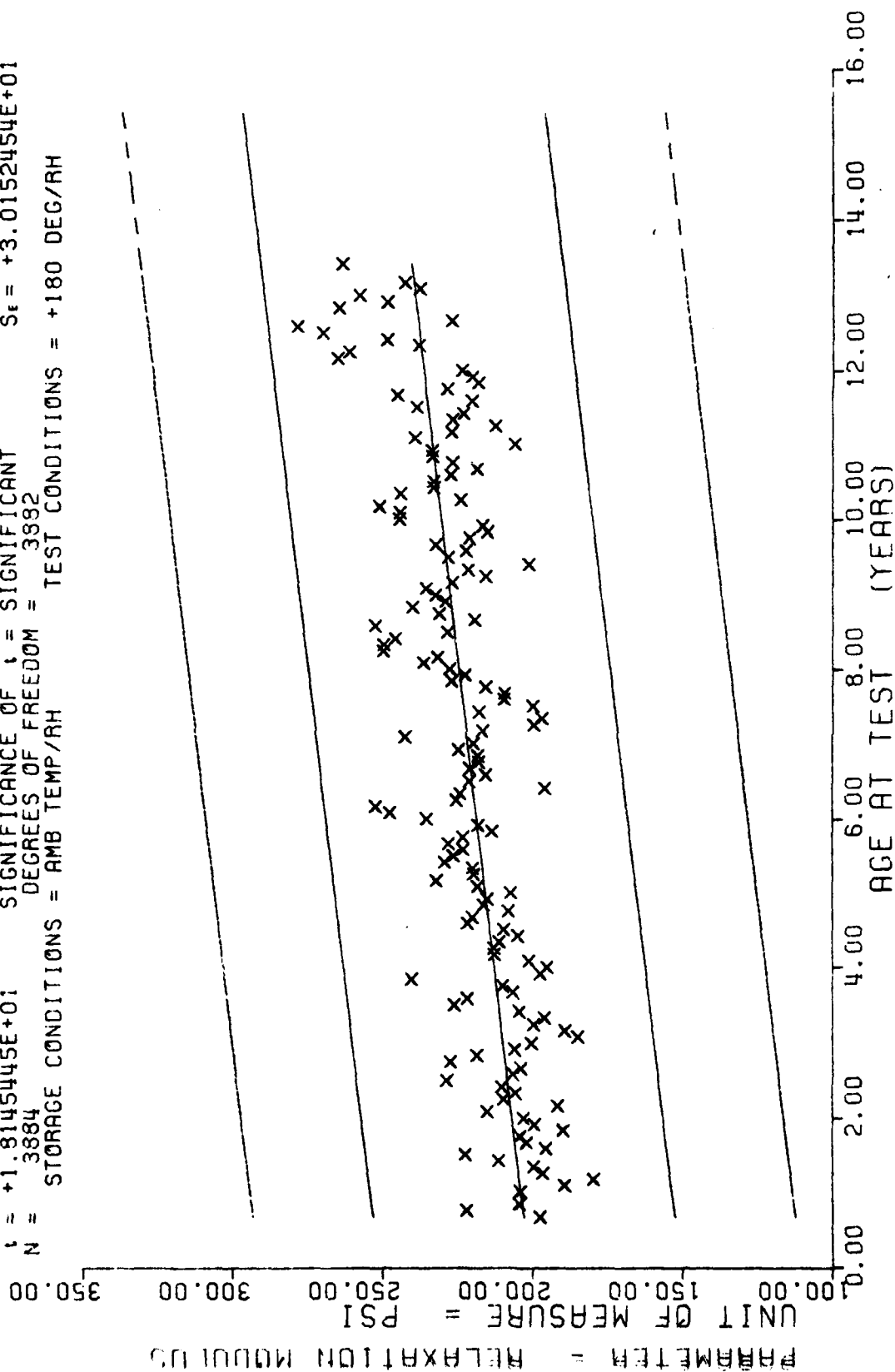
This sample size summary is applicable to figures 50 thru 53

$Y = ((+2.3763743E+02) + (+2.9412707E-01) * X)$
 $F = -3.2329559E+02$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +2.7726919E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = -1.7980422E+01$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 3884$ DEGREES OF FREEDOM = 3882
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +180 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 180 DEG F, TPH-1011

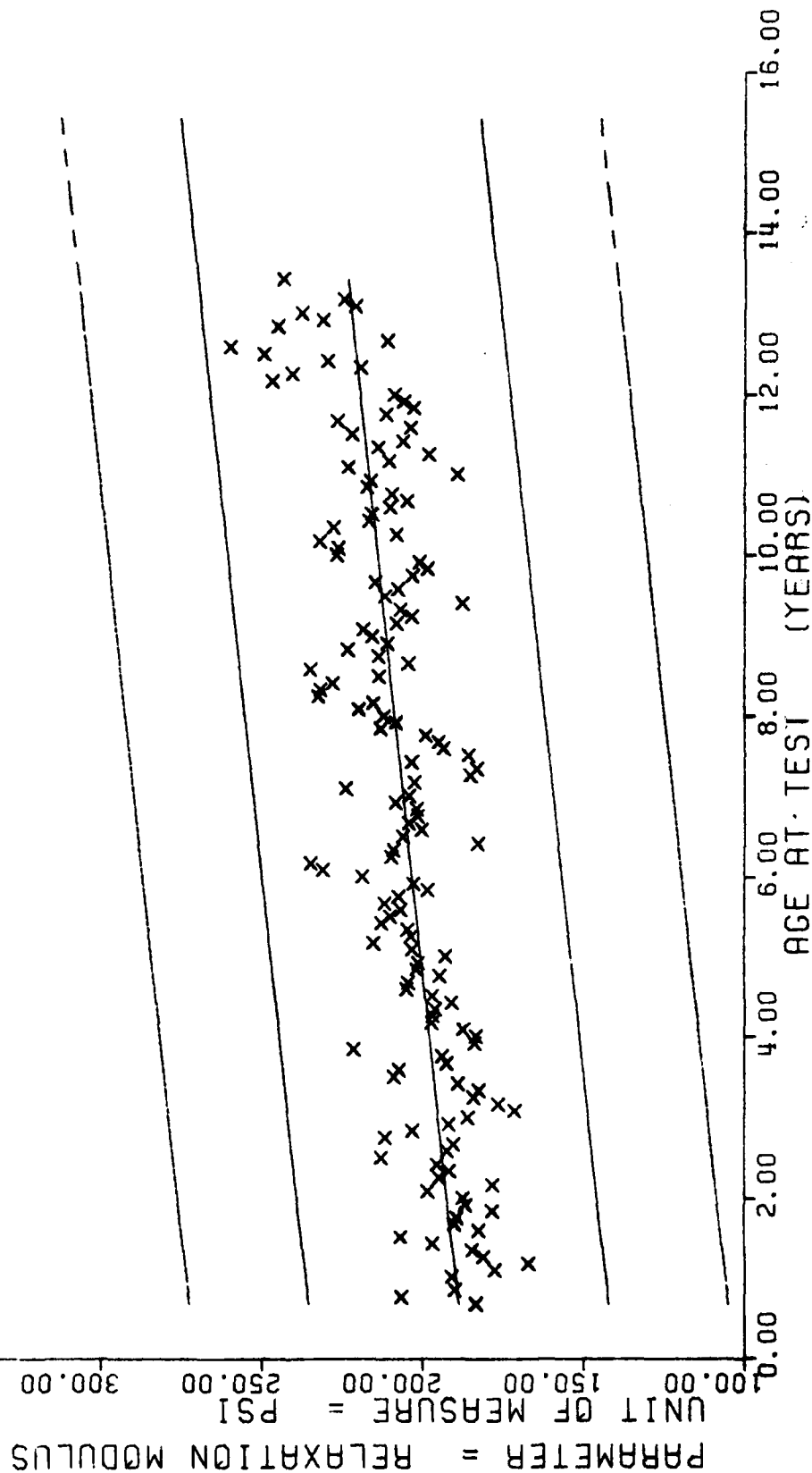
$Y = ((+2.0105025E+02) + (+2.4426620E-01) * X)$
 $F = +3.2925720E+02$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +2.7961583E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +1.8145445E+01$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 3884$ DEGREES OF FREEDOM = 3882
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +180 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 180 DEG F, TPH-1011

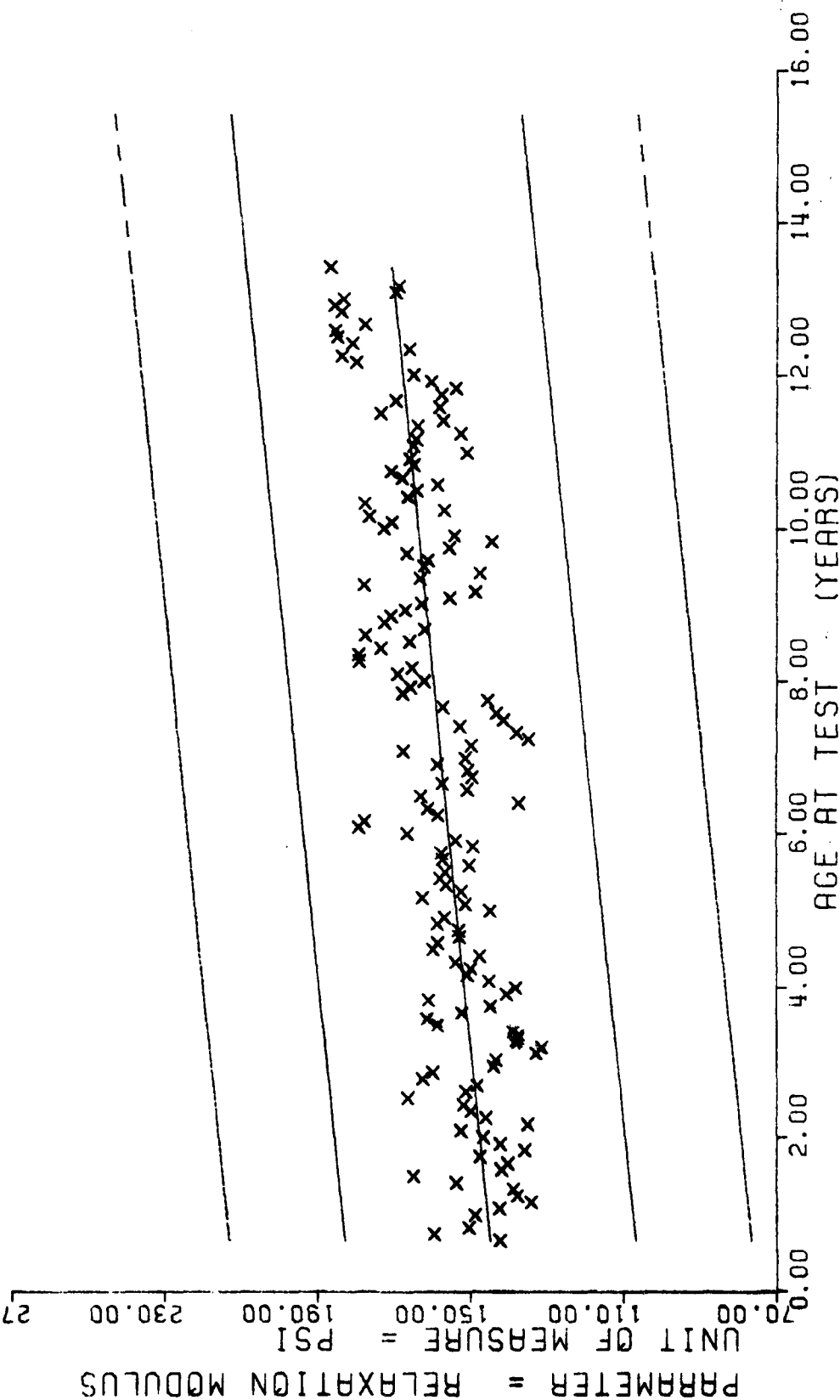
Figure 51

$Y = ((+1.8696139E+02) + (+2.2536715E-01) * X)$
 F = +3.2664948E+02 SIGNIFICANCE OF F = SIGNIFICANT $G_1 = +2.9077981E+01$
 R = +2.7859262E-01 SIGNIFICANCE OF R = SIGNIFICANT $S_1 = +1.2469517E-02$
 t = +1.8073447E+01 SIGNIFICANCE OF t = SIGNIFICANT $S_t = +2.7930362E+01$
 N = 3884 DEGREES OF FREEDOM = 3882
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +180 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC. 180 DEG F, TPH-101

$\chi^2 = ((+1.4353934E+02) + (+1.6866664E-01) * \chi)$
 F = +2.7521910E-02 SIGNIFICANCE OF F = SIGNIFICANT $G_y = +2.3566013E+01$
 R = +2.5729884E-01 SIGNIFICANCE OF R = SIGNIFICANT $S_a = +1.0168137E-02$
 t = +1.6589728E-01 SIGNIFICANCE OF t = SIGNIFICANT $S_e = +2.2775523E+01$
 N = 3884 DEGREES OF FREEDOM = 3882
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +180 DEG/RH



WING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 180 DEG F, TPH-1011

Figure 53

*** SAMPLE SIZE SUMMARY ***

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
1	3	34	48	59	30	66	16	110	24
4	4	35	64	60	61	65	13	111	50
10	24	36	47	61	54	66	16	112	20
12	12	37	56	62	58	67	15	113	20
13	32	38	47	63	61	68	29	114	76
14	36	39	56	64	72	69	74	115	76
15	20	40	45	65	80	70	44	116	71
16	20	41	36	66	33	71	43	117	32
17	28	42	20	67	52	72	32	118	120
18	32	43	20	68	57	73	23	119	98
19	52	44	4	69	59	74	32	120	104
20	12	45	12	70	48	75	39	121	76
21	32	46	15	71	68	76	36	122	60
22	28	47	30	72	70	77	44	123	8
23	24	48	36	73	40	78	36	124	12
24	8	49	44	74	95	79	80	125	7
25	40	50	24	75	60	80	80	126	28
26	50	51	60	76	40	81	56	127	20
27	32	52	103	77	44	82	32	128	48
28	44	53	112	78	54	83	36	129	23
29	43	54	38	79	30	84	12	130	74
30	44	55	42	80	50	85	4	131	128
31	72	56	70	81	40	86	28	132	79
32	64	57	43	82	20	87	16	133	52
33	52	58	86	83	40	88	12	134	48

STAGE 1, WING 6, TP-H1011, SUL GEL, DENSITY

This sample size summary is applicable to figure 54

AD-A078 777

OGDEN AIR LOGISTICS CENTER HILL AFB UTAH PROPELLANT L--ETC F/G 21/9
PROPELLANT SURVEILLANCE REPORT L&M-30 F & G STAGE 1 PHASE E, SE--ETC(U)
OCT 79 J A THOMPSON
MANCP-423(79)

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$\gamma = ((+1.7688319E+00) + (-6.774896E-06) * X)$
 F = +1.873C234E+00
 R = -1.7840337E-02
 t = +1.3685844E+00
 N = 5885
 STORAGE CONDITIONS = AMB TEMP/RH
 SIGNIFICANCE OF F = NOT SIGNIFICANT
 SIGNIFICANCE OF R = NOT SIGNIFICANT
 SIGNIFICANCE OF t = NOT SIGNIFICANT
 DEGREES OF FREEDOM = 5883
 TEST CONDITIONS = AMB TEMP/RH
 $G_v = +1.4345296E-02$
 $S_a = +4.9521895E-06$
 $S_e = +1.4344232E-02$

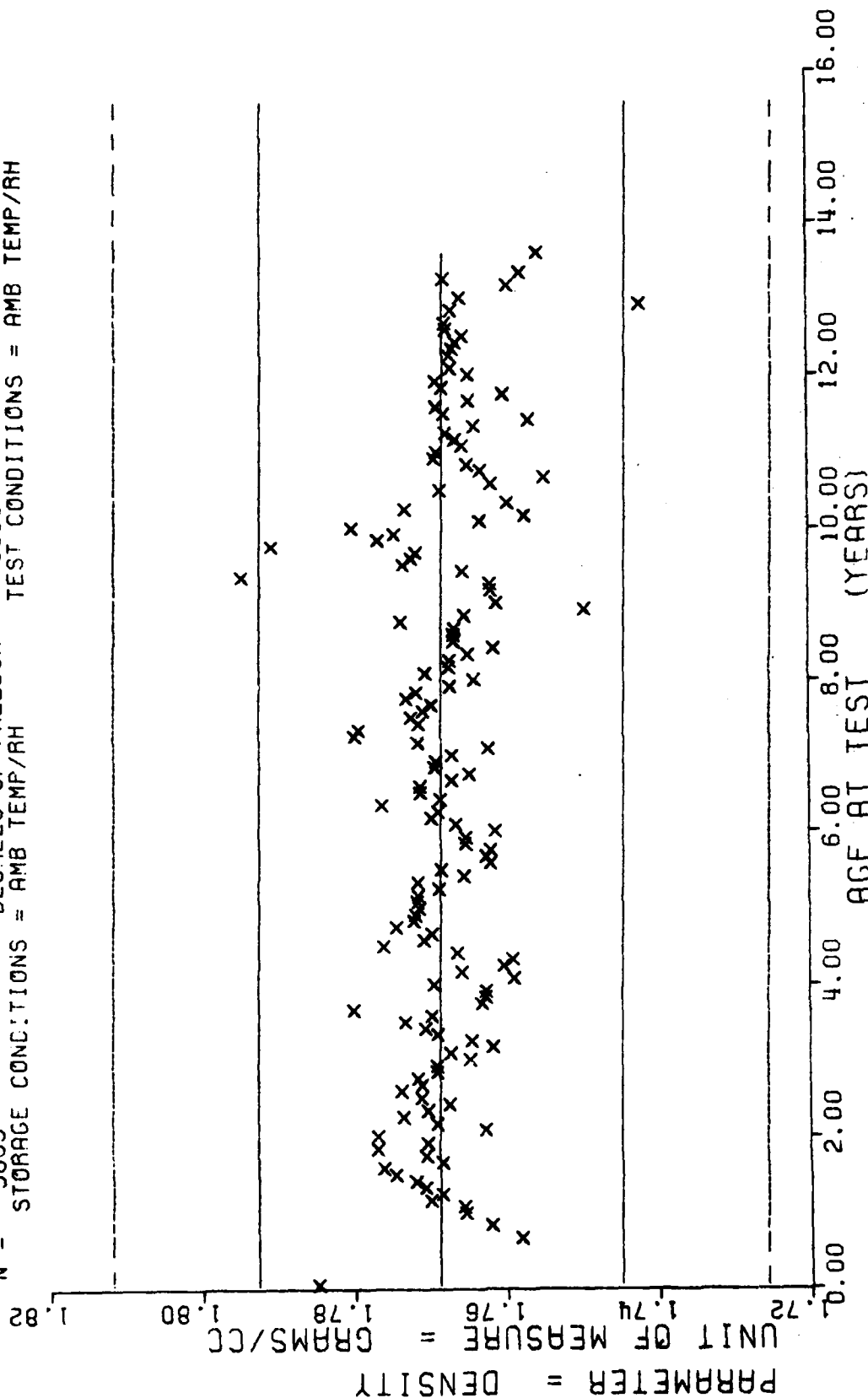


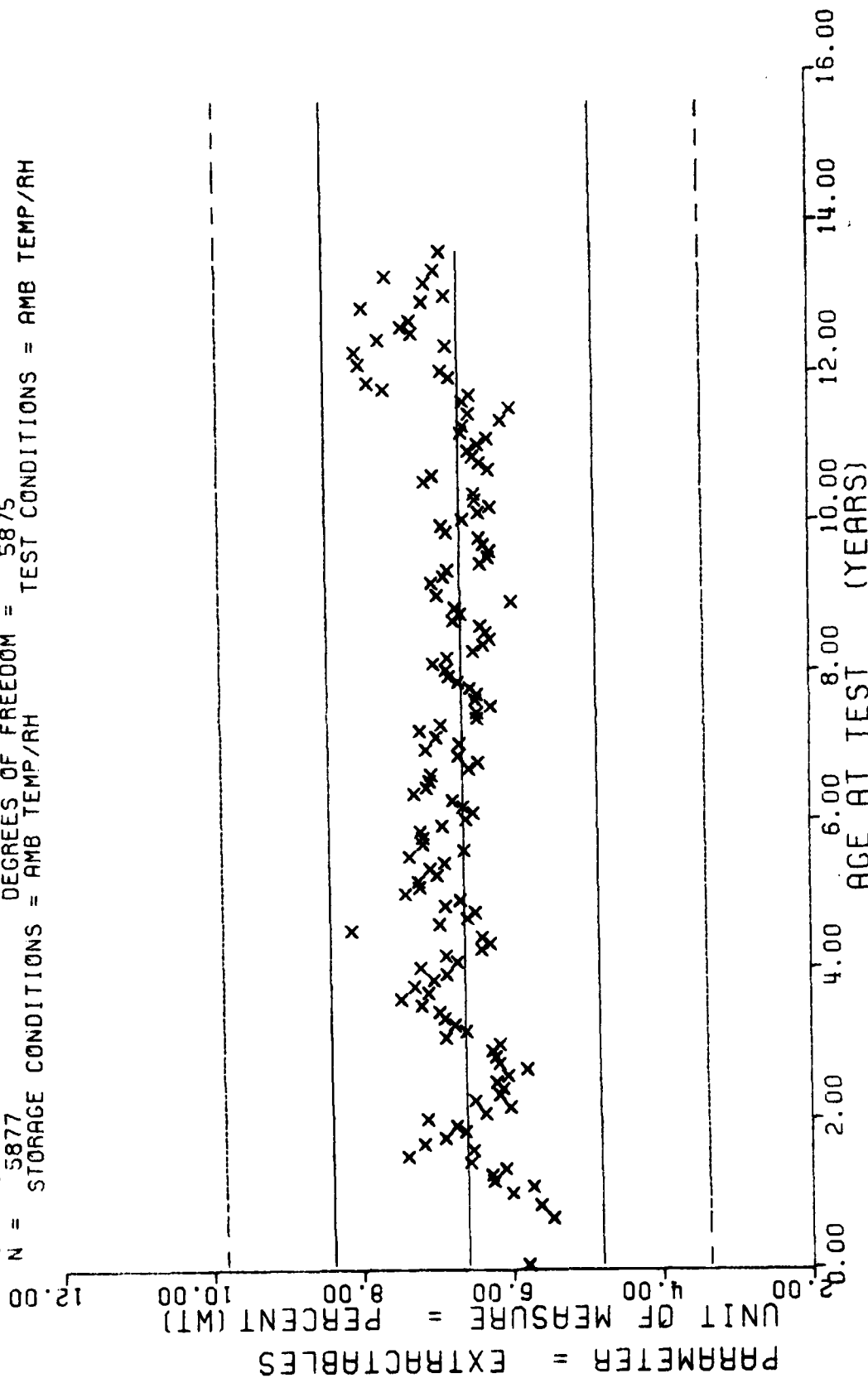
Figure 54

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
1	3	34	48	53	50	84	16	110	24	136	32
8	4	35	64	85	61	85	13	111	60	137	19
10	24	36	47	86	55	86	15	112	20	138	34
12	12	37	56	87	50	87	16	113	20	139	122
13	32	38	47	88	61	88	25	114	76	140	34
14	36	39	36	89	72	89	44	115	76	141	4
15	1	40	45	90	86	90	44	116	69	142	4
16	20	41	36	91	53	91	48	117	31	143	12
17	28	42	26	92	52	92	32	118	120	144	15
18	32	43	20	93	57	93	23	119	98	145	4
19	52	44	4	94	53	94	32	120	104	147	4
20	12	45	12	95	43	95	39	121	76	148	12
21	32	46	19	96	68	96	35	122	60	149	4
22	28	47	36	97	70	97	43	123	8	150	12
23	24	48	36	98	40	98	36	124	12	151	11
24	8	49	44	99	95	99	80	126	7	152	12
25	40	50	24	100	60	100	90	127	28	154	4
26	56	51	60	101	40	101	56	128	20	155	4
27	32	52	103	102	44	102	32	129	48	156	12
28	44	53	111	103	54	103	36	130	23	158	4
29	43	54	38	104	38	104	12	131	74	159	7
30	44	55	42	105	50	105	4	132	128	160	4
31	72	56	70	106	39	106	28	133	79	163	4
32	64	57	43	107	20	107	16	134	52		
33	52	58	86	108	40	108	12	135	48		

STAGE 1, WING 6 TP-H1011, SOL GEL, PERCENT EXTRACTABLES

This sample size summary is applicable to figure 55

$Y = ((+6.5935411E+00) + (+5.3962338E-04) * X)$
 $F = +2.1023689E+00$ SIGNIFICANCE OF F = NOT SIGNIFICANT $G = +1.0777311E+00$
 $R = +1.8913540E-02$ SIGNIFICANCE OF R = NOT SIGNIFICANT $S_e = +3.7216585E-04$
 $t = +1.4499548E+00$ SIGNIFICANCE OF t = NOT SIGNIFICANT $S_e = +1.0776300E+00$
 $N = 5877$ DEGREES OF FREEDOM = 5875
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



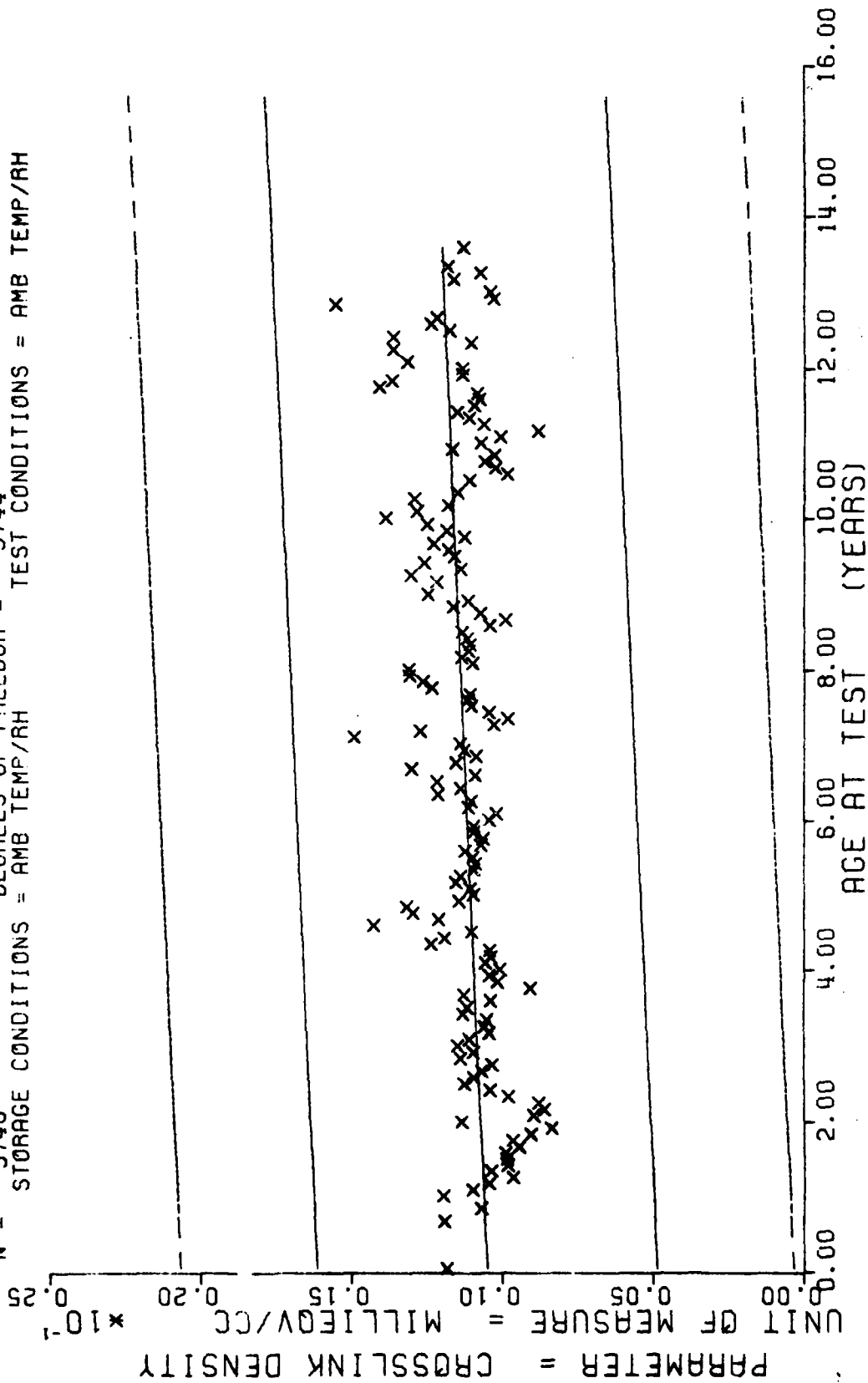
*** SAMPLE SIZE SUMMARY ***

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
1	3	34	46	59	30	04	16	110	24	130	24	130	24
3	4	35	64	60	61	85	13	111	00	137	15	137	15
10	24	36	47	61	54	86	16	112	20	136	39	136	39
12	12	37	56	62	50	87	16	113	20	139	62	139	62
13	32	38	47	63	61	88	28	114	76	140	29	140	29
14	36	39	36	64	72	89	44	115	76	141	4	141	4
15	20	40	45	65	60	90	44	116	71	142	4	142	4
16	20	41	30	66	39	91	48	117	32	143	12	143	12
17	20	42	25	67	52	92	32	118	120	144	15	144	15
18	32	43	20	68	57	93	23	119	98	145	4	145	4
19	52	44	4	69	59	94	32	120	104	147	4	147	4
20	12	45	12	70	48	95	39	121	76	148	12	148	12
21	32	46	19	71	68	96	36	122	60	149	4	149	4
22	28	47	36	72	70	97	43	123	8	150	12	150	12
23	24	48	30	73	48	98	36	124	12	151	11	151	11
24	8	49	44	74	95	99	80	126	7	152	12	152	12
25	40	50	24	75	60	100	80	127	28	154	4	154	4
26	56	51	60	76	40	101	56	128	20	155	4	155	4
27	32	52	103	77	44	102	32	129	48	156	12	156	12
28	44	53	112	78	54	103	36	130	23	158	4	158	4
29	43	54	14	79	38	104	12	131	74	159	7	159	7
30	44	55	42	80	50	105	4	132	128	160	4	160	4
31	72	56	70	81	40	106	28	133	79	163	4	163	4
32	04	57	43	82	20	107	16	134	40				
33	52	58	66	83	39	108	12	135	28				

STAGE 1, WING 6, TP-H1011, SUL GEL, CROSSLINK DENSITY

This sample size summary is applicable to figure 56

$r = ((+1.0511325E-02) + (+9.0899829E-06) * X)$
 F = +5.7472972E+01 SIGNIFICANCE OF F = SIGNIFICANT $G_r = +3.4057633E-03$
 R = +9.9531991E-02 SIGNIFICANCE OF R = SIGNIFICANT $S_a = +1.1990332E-06$
 t = +7.5810931E+00 SIGNIFICANCE OF t = SIGNIFICANT $S_e = +3.3891465E-03$
 N = 5746 DEGREES OF FREEDOM = 5744
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



STAGE 1, WING 6, TP-H1C11, SOL GEL, CROSSLINK DENSITY

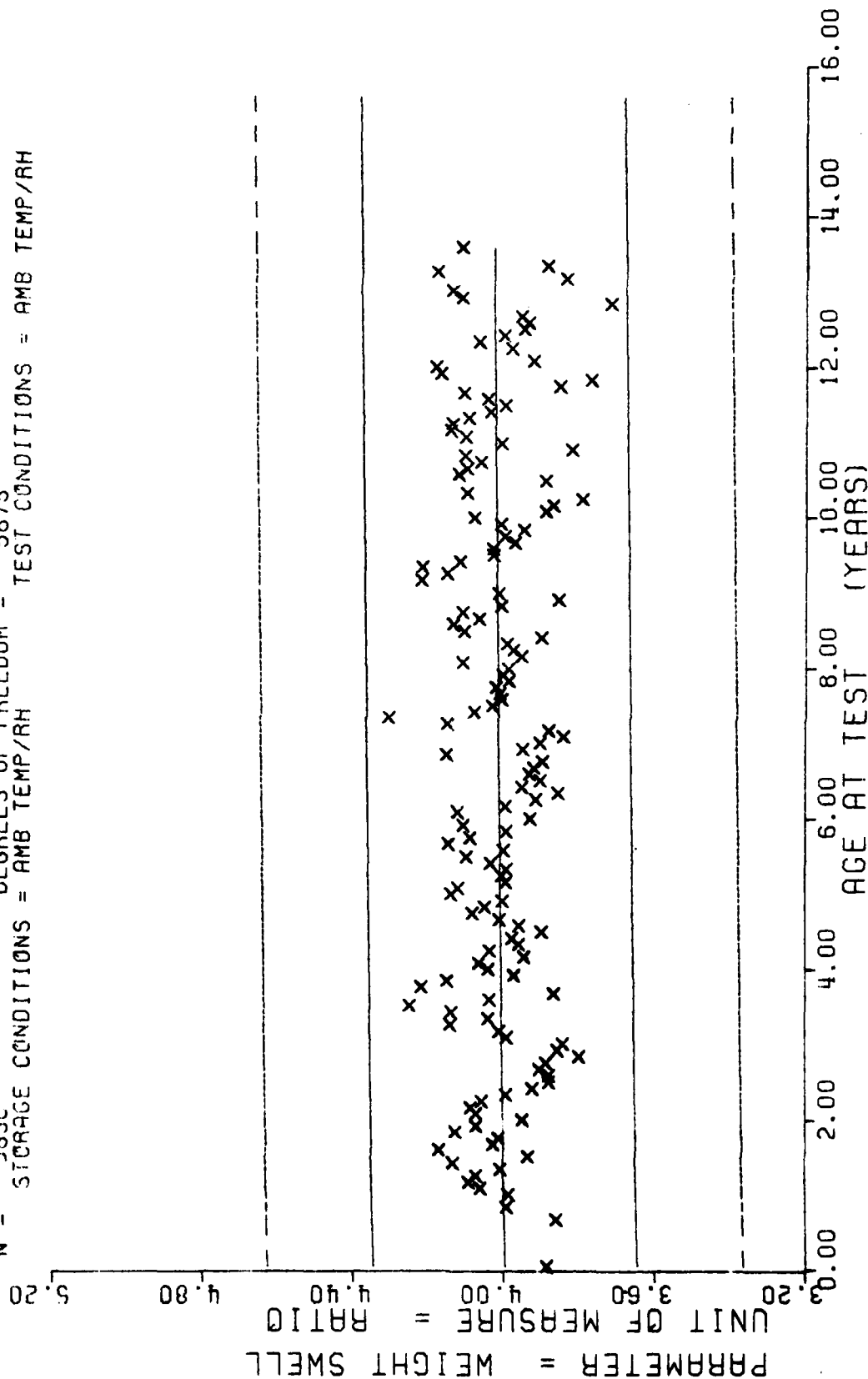
Figure 56

[illegible]

STAGE 1, WING 6, TP-H1011, SOL GEL, GEL SWELL RATIO

This sample size summary is applicable to figure 57

$Y = ((+3.9965914E+00) + (+2.0185152E-04) * X)$
 $F = +7.7151429E+00$ SIGNIFICANCE OF F = SIGNIFICANT $\sigma_r = +2.1057346E-01$
 $R = +3.5205318E-02$ SIGNIFICANCE OF R = SIGNIFICANT $S_a = +7.2670816E-05$
 $t = +2.7776146E+00$ SIGNIFICANCE OF t = SIGNIFICANT $S_t = +2.1045330E-01$
 $N = 5880$ DEGREES OF FREEDOM = 5878
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



STAGE 1, WING 6, TP-H1011, SOL GEL, GEL SWELL RATIO

Figure 57

[illegible]

STAGE 1	WING 6	TP-H 1011	CONSTANT STRAIN
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31
32	32	32	32
33	33	33	33
34	34	34	34
35	35	35	35
36	36	36	36
37	37	37	37
38	38	38	38
39	39	39	39
40	40	40	40
41	41	41	41
42	42	42	42
43	43	43	43
44	44	44	44
45	45	45	45
46	46	46	46
47	47	47	47
48	48	48	48
49	49	49	49
50	50	50	50
51	51	51	51
52	52	52	52
53	53	53	53
54	54	54	54
55	55	55	55
56	56	56	56
57	57	57	57
58	58	58	58
59	59	59	59
60	60	60	60
61	61	61	61
62	62	62	62
63	63	63	63
64	64	64	64
65	65	65	65
66	66	66	66
67	67	67	67
68	68	68	68
69	69	69	69
70	70	70	70
71	71	71	71
72	72	72	72
73	73	73	73
74	74	74	74
75	75	75	75
76	76	76	76
77	77	77	77
78	78	78	78
79	79	79	79
80	80	80	80
81	81	81	81
82	82	82	82
83	83	83	83
84	84	84	84
85	85	85	85
86	86	86	86
87	87	87	87
88	88	88	88
89	89	89	89
90	90	90	90
91	91	91	91
92	92	92	92
93	93	93	93
94	94	94	94
95	95	95	95
96	96	96	96
97	97	97	97
98	98	98	98
99	99	99	99
100	100	100	100

This sample size summary is applicable to figure 58

$Y = ((+2.6006519E+01) + (-1.8644113E-02) * X)$
 F = +3.9323113E+02 SIGNIFICANCE OF F = SIGNIFICANT
 R = -2.5733295E-01 SIGNIFICANCE OF R = SIGNIFICANT
 t = +1.9830055E+01 SIGNIFICANCE OF t = SIGNIFICANT
 N = 5547 DEGREES OF FREEDOM = 5345
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

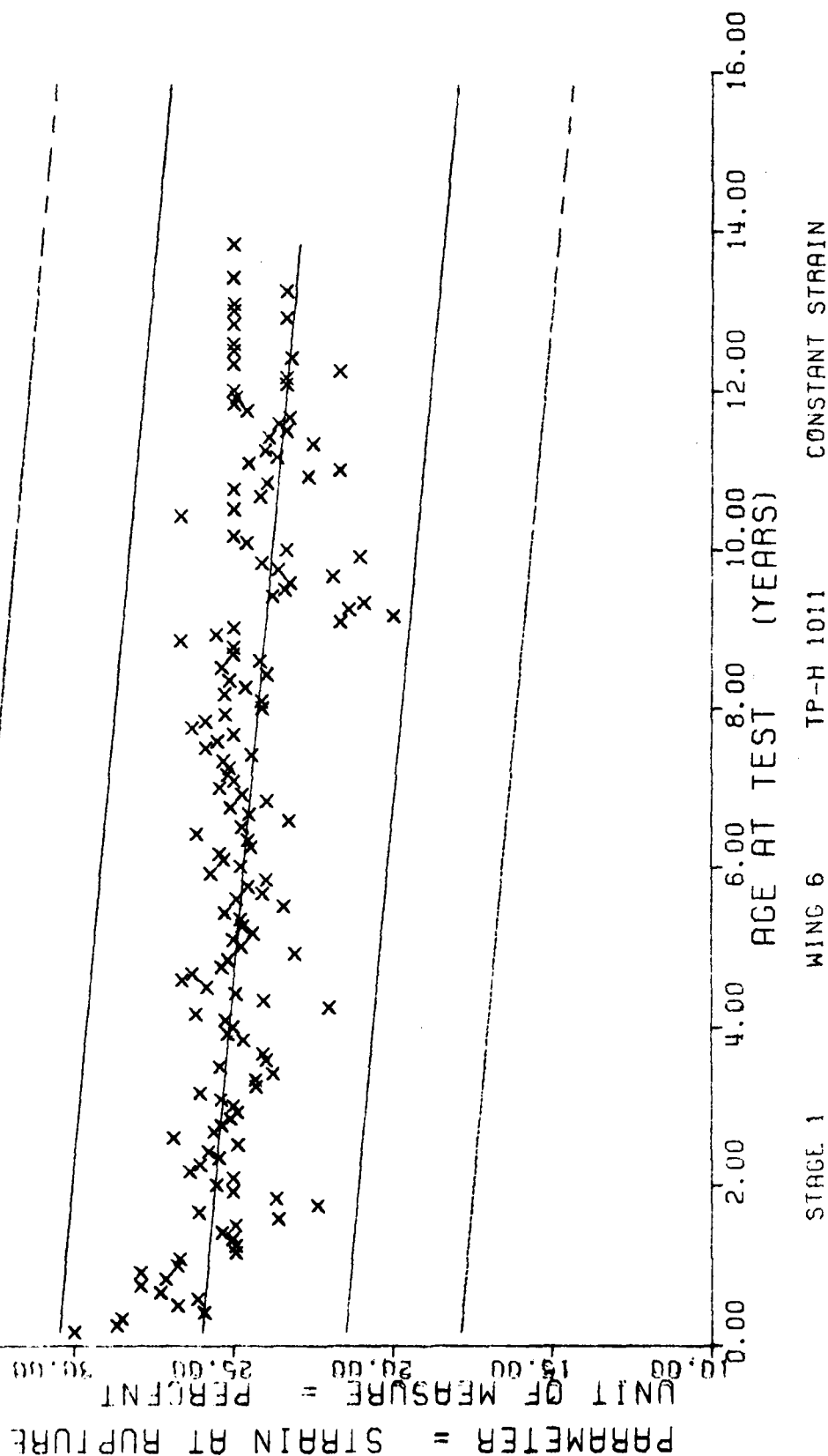


Figure 58

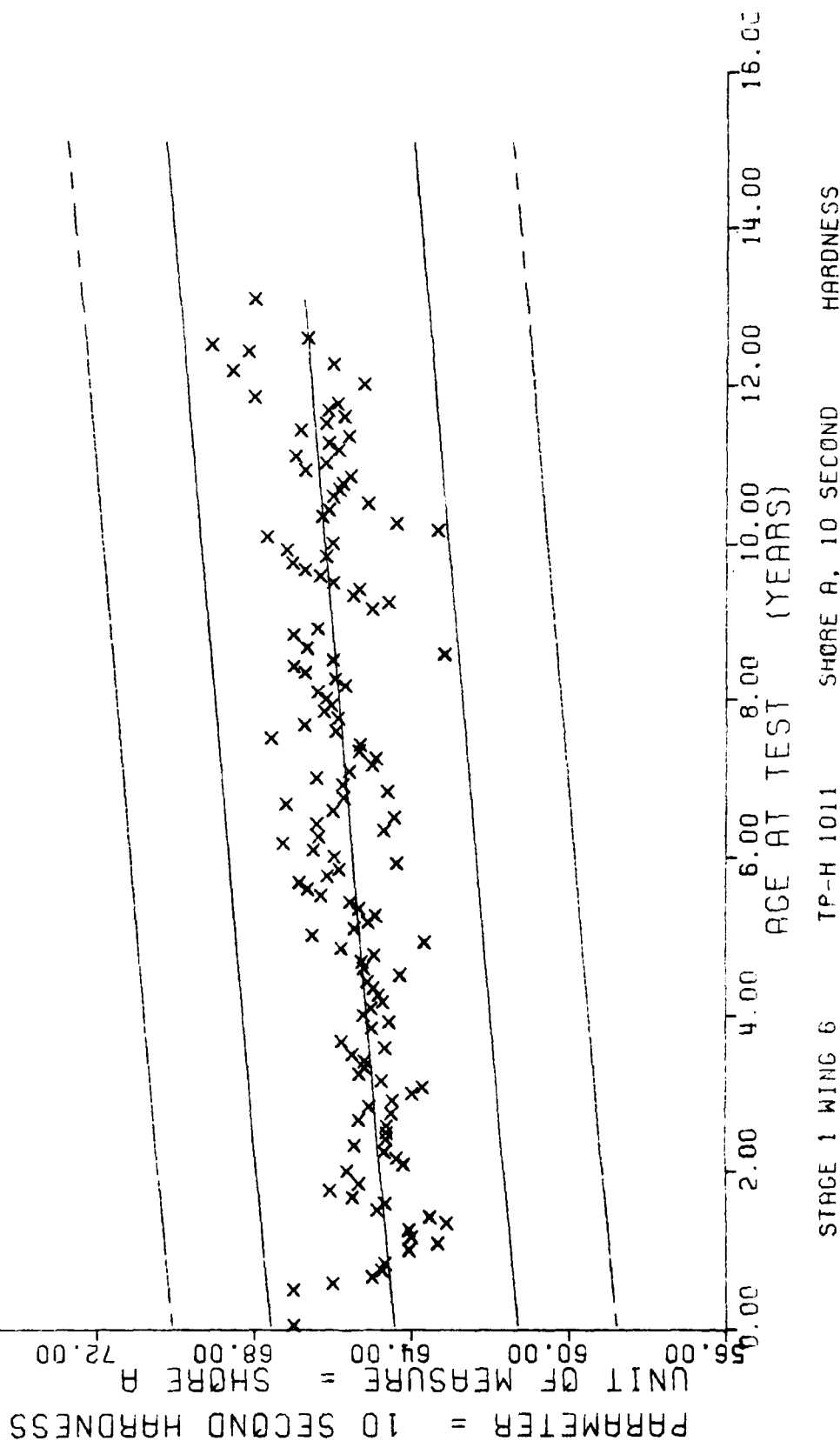
*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	32	30	58	51	83	12	110	21	135	18	135	21	135	18
5	3	33	24	59	27	84	12	111	12	136	30	136	12	136	30
7	3	34	27	60	30	85	27	112	21	137	18	137	21	137	18
9	3	35	27	61	42	86	6	113	48	138	61	138	48	138	61
9	12	36	45	62	51	87	21	114	21	139	45	139	21	139	45
10	6	37	18	63	70	88	36	115	6	140	24	140	6	140	24
12	18	38	21	64	39	89	36	116	36	141	18	141	36	141	18
13	15	39	45	65	9	90	42	117	36	142	3	142	36	142	3
14	0	40	15	66	27	91	15	118	6	144	18	144	6	144	18
15	30	41	21	67	33	92	33	119	12	146	9	146	12	146	9
16	18	42	6	68	48	93	15	120	27	147	3	147	27	147	3
17	15	43	6	69	71	94	27	121	6	149	6	149	6	149	6
18	15	44	9	70	93	95	27	122	3	150	9	150	3	150	9
19	6	45	12	71	21	96	12	123	21	151	3	151	21	151	3
20	2	47	9	72	30	97	69	124	15	157	3	157	15	157	3
21	15	48	51	73	30	98	51	125	27				27		
22	3	49	45	74	30	99	51	126	18				18		
24	27	50	51	75	33	100	48	127	33				33		
25	21	51	57	76	30	101	6	128	36				36		
26	39	52	72	77	27	102	15	129	24				24		
27	12	53	27	78	27	103	6	130	39				39		
28	21	54	24	79	21	104	15	131	38				38		
29	24	55	39	80	15	106	3	132	21				21		
30	21	56	60	81	41	107	18	133	24				24		
31	39	57	69	82	18	109	3	134	21				21		

STAGE 1 WING 6 TP-H 1011 SHURE A. 10 SECOND HARDNESS

This sample size summary is applicable to figure 59

$Y = (-3.435337E+01) + (+1.4719484E-02) * X$
 $F = +2.7916614E+02$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = -2.6979834E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +1.6708265E+01$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 3558$ DEGREES OF FREEDOM = 3556
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



*** SAMPLE SIZE SUMMARY ***

AGE (MJS)	NR SAMP	AGE (MJS)	NR SAMP	AGE (MJS)	NR SAMP	AGE (MJS)	NR SAMP	AGE (MJS)	NR SAMP
6	3	34	39	59	51	84	9	115	50
10	15	35	54	60	31	85	3	116	55
11	1	36	39	61	28	86	3	117	7
12	6	37	13	62	53	87	3	118	10
13	15	38	11	63	37	88	12	119	39
14	13	39	16	64	60	89	21	120	12
15	16	40	11	65	72	90	36	121	5
16	17	41	13	66	33	91	24	122	50
17	18	42	30	67	56	92	9	123	55
18	19	43	4	68	38	93	17	124	5
19	22	44	10	69	40	94	15	125	6
20	35	45	7	70	46	95	19	126	18
21	16	46	12	71	11	96	18	127	25
22	19	47	16	72	12	97	38	128	3
23	21	48	4	73	3	98	47	129	12
24	19	49	36	74	1	99	26	130	12
25	25	50	13	75	36	100	23		
26	27	51	38	76	26	101	21		
27	36	52	35	77	22	102	8		
28	38	53	47	78	13	103	6		
29	43	54	37	79	7	104	9		
30	24	55	26	80	21	105	6		
31	51	56	21	81	24	106	3		
32	42	57	25	82	7	107	3		
33	54	58	22	83	9	108	11		

STAGE 1 BING 6 TP-H 1011 MAXIMUM PRESSURE PRESSURE TIME

This sample size summary is applicable to figures 60 and 61

$Y = ((+3.5815351E+03) + (-9.2957907E-02) * X)$
 SIGNIFICANCE OF F = NOT SIGNIFICANT $G_1 = +9.9966427E+01$
 SIGNIFICANCE OF R = NOT SIGNIFICANT $S_2 = +5.9135961E-02$
 SIGNIFICANCE OF t = NOT SIGNIFICANT $S_3 = +9.9938787E+01$
 DEGREES OF FREEDOM = 2658
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 500 PSI INT PRES

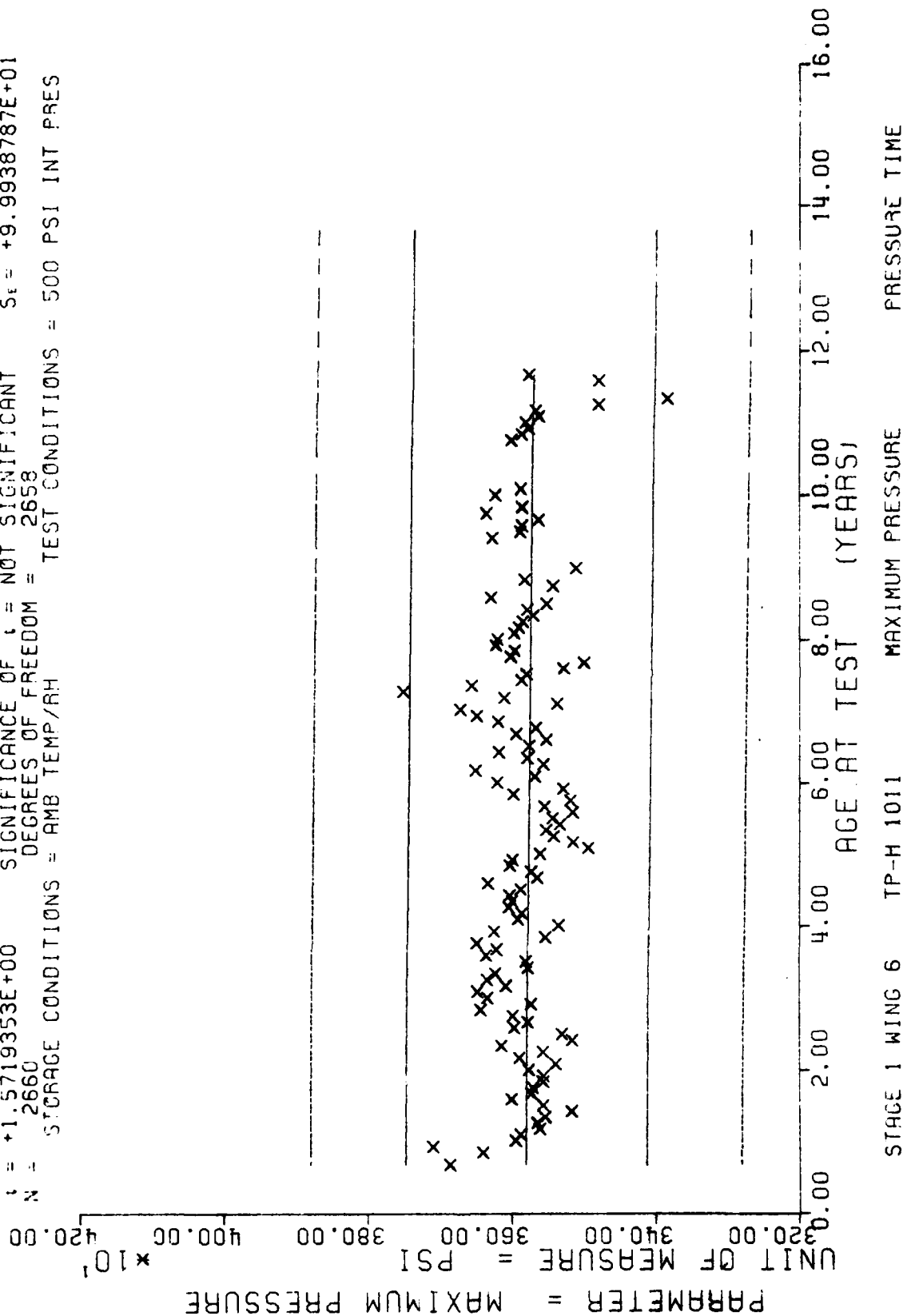
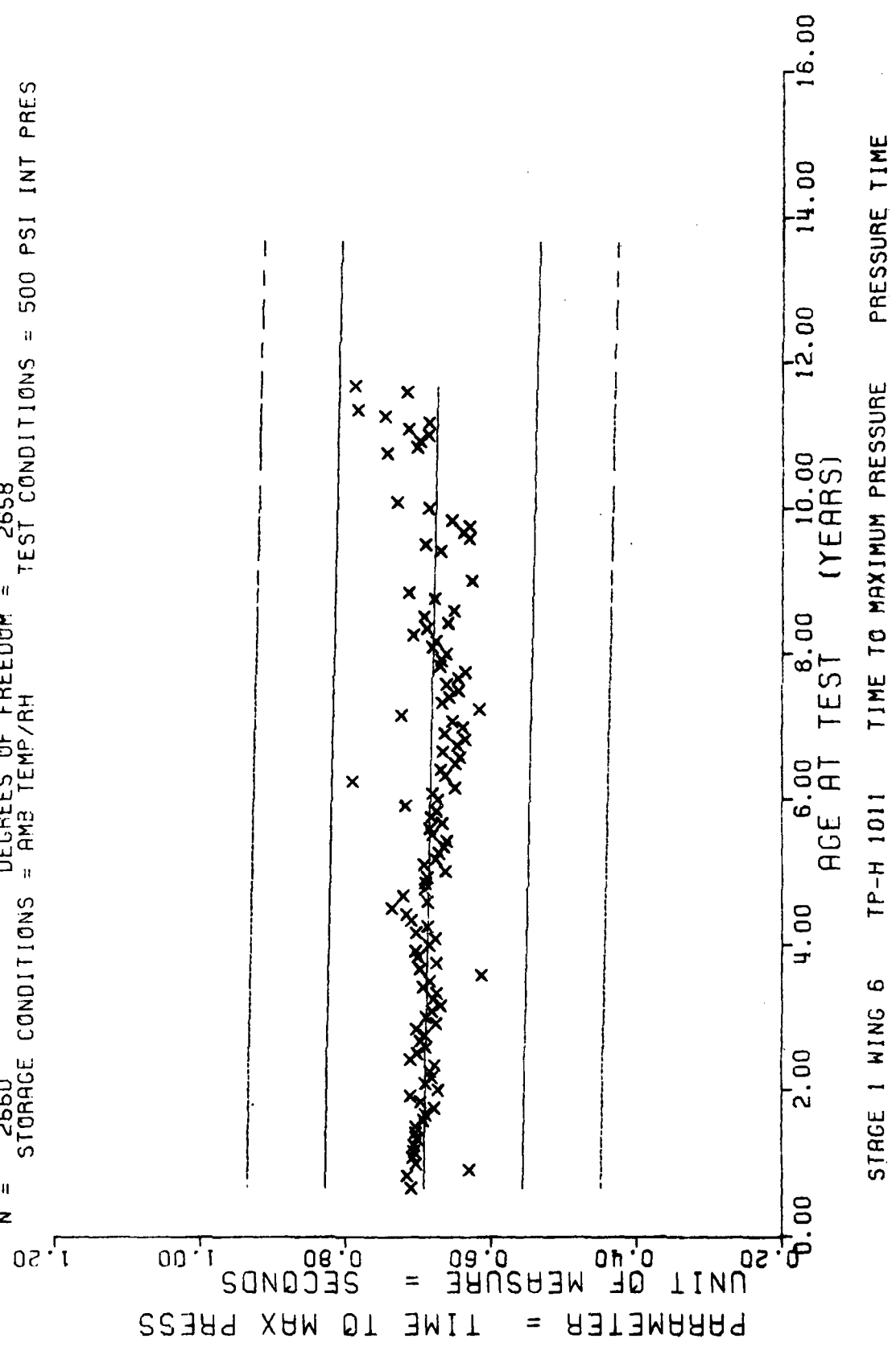


Figure 60

$Y = ((+6.9360870E-01) + (-1.4483825E-04) * X)$
 $F = +9.1467244E+00$ SIGNIFICANCE OF F = SIGNIFICANT $G = +8.1058242E-02$
 $R = -5.8561116E-02$ SIGNIFICANCE OF R = SIGNIFICANT $S = +4.7890622E-05$
 $t = +3.0243552E+00$ SIGNIFICANCE OF t = SIGNIFICANT $S_t = +8.0934352E-02$
 $N = 2660$ DEGREES OF FREEDOM = 2658
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 500 PSI INT PRES



STAGE 1 WING 6 TP-H 1011

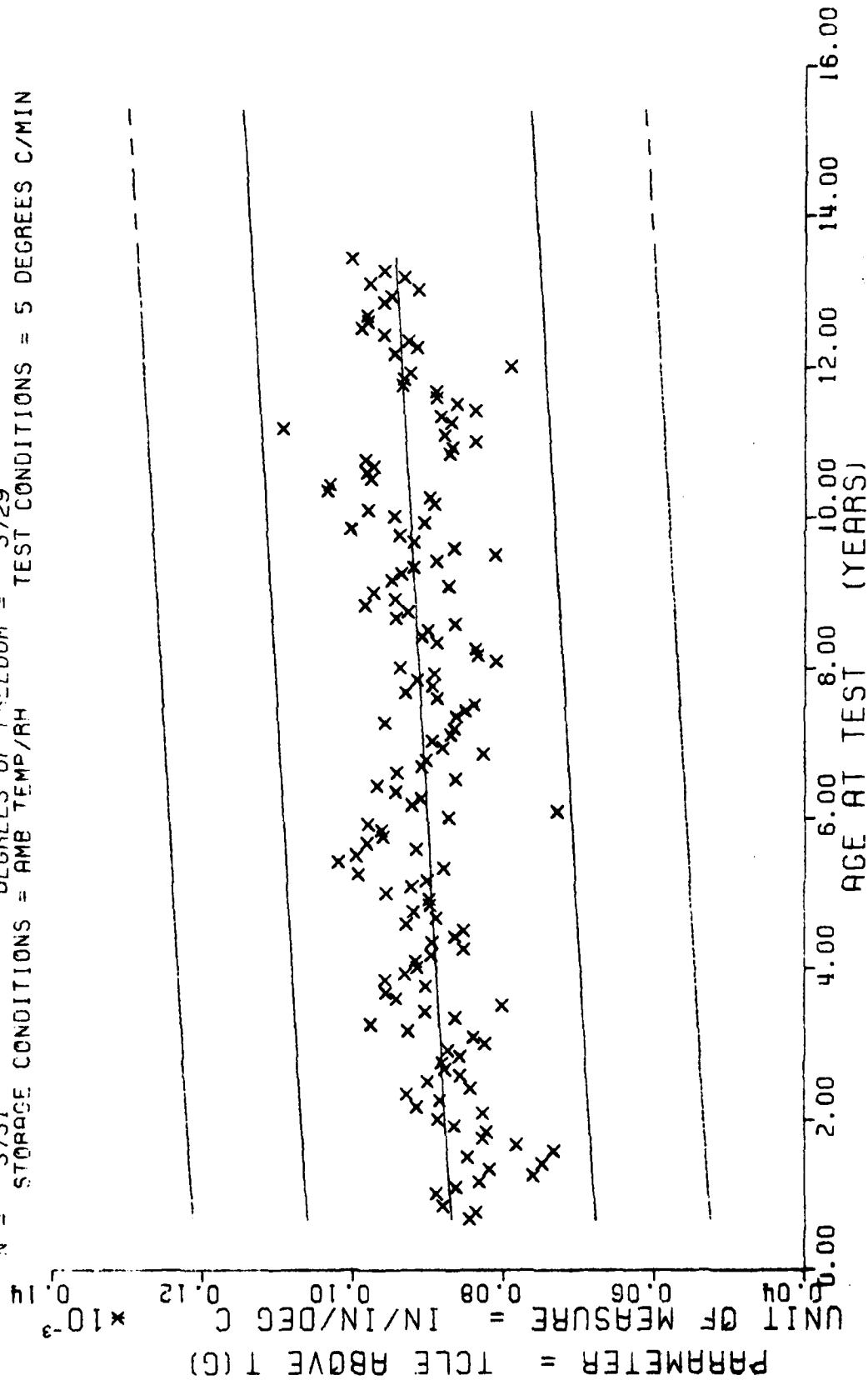
Figure 61

[illegible]

STAGE 1, WING 6, TP-H1011, THERMAL COEFFICIENT OF LINEAR EXPANSION ABOVE TG

This sample size summary is applicable to figure 62

$F = +9.6907146E+01$
 $R = +1.5915148E-01$
 $t = +9.8441427E+00$
 $N = 3731$
 $Y = ((+8.6565389E-05) + (+4.8616045E-08) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 3729
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 5 DEGREES C/MIN



STAGE 1, WING 6, TP-H1011, THERMAL COEFFICIENT OF LINEAR EXPANSION ABOVE TG

[illegible]

TP-H1011 THERMAL COEFFICIENT OF LINEAR EXPANSION BELOW TG

This sample size summary is applicable to figure 63

$F = +9.8310697E+01$
 $R = +1.6027047E-01$
 $t = +9.3151751E+00$
 $N = 373$
 $Y = ((+5.6426988E-05) + (+2.4085805E-08) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 3729
 STORAGE CONDITIONS = AMB TEMP/RH
 TEST CONDITIONS = 5 DEGREES C/MIN

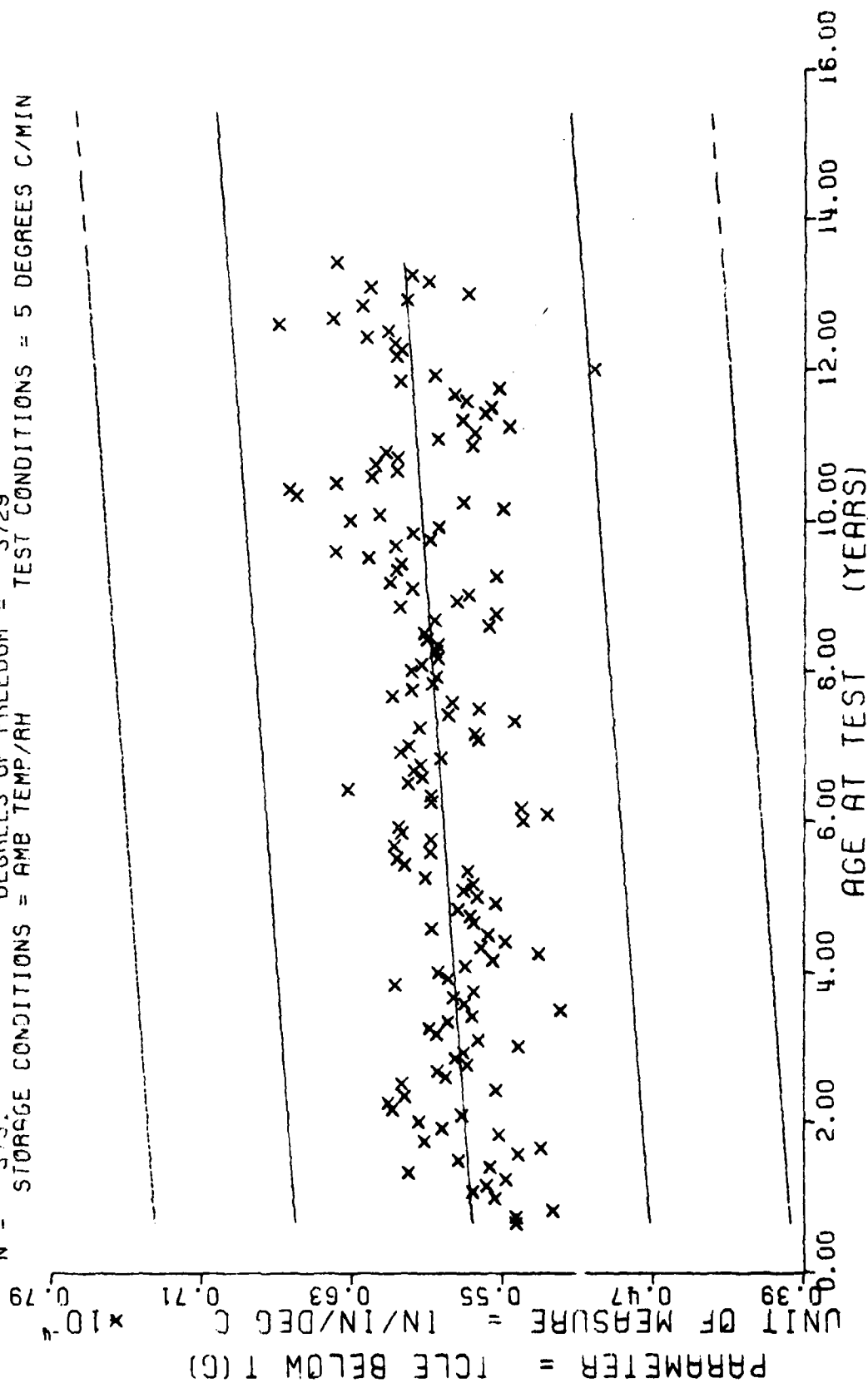


Figure 63

*** SAMPLE SIZE SUMMARY ***

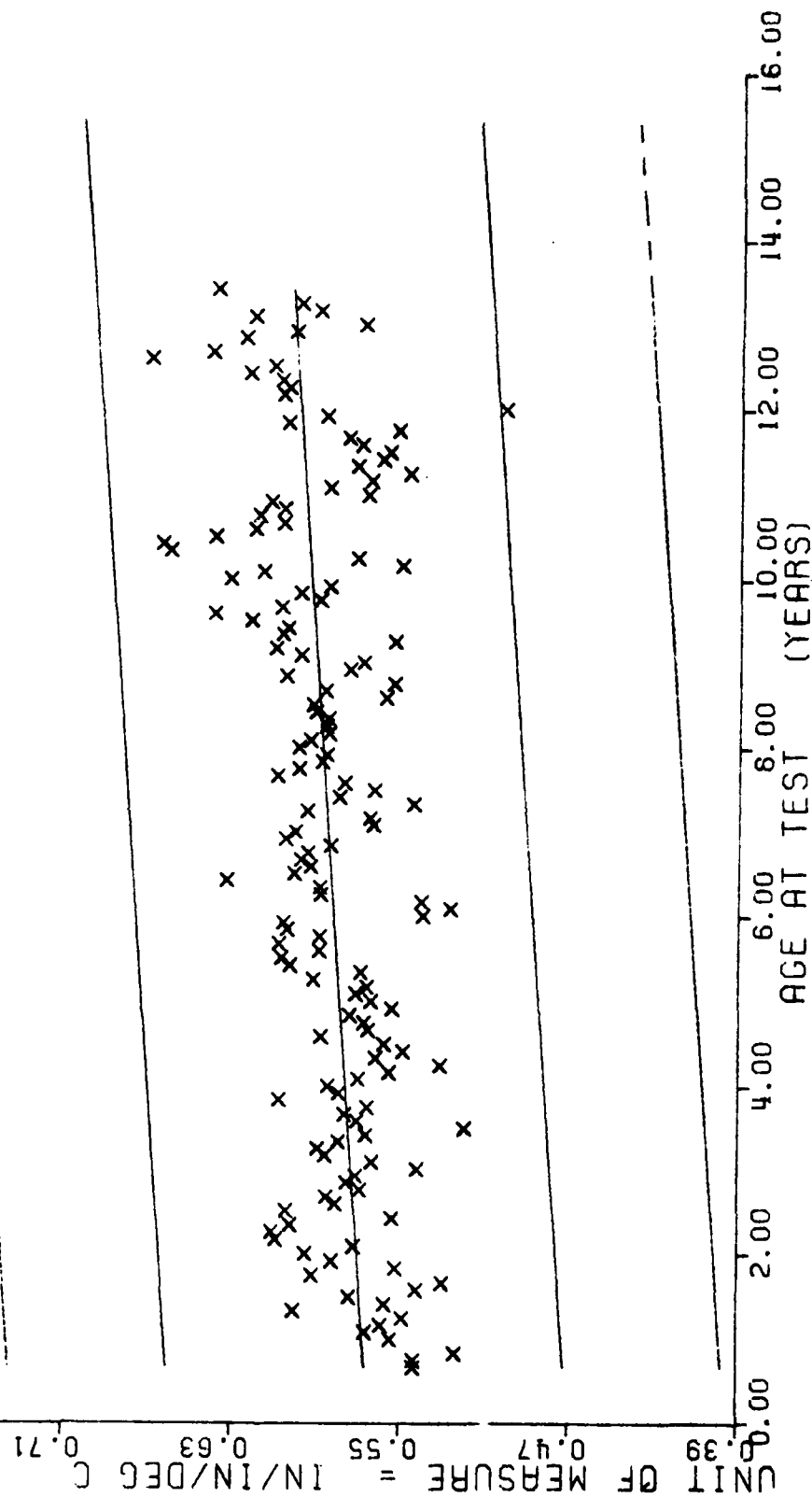
AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	37	13	65	14	95	7	125	2	157	2		
10	1	38	4	66	21	96	4	126	2	158	4		
11	1	39	7	67	32	97	6	127	2	161	2		
13	1	40	5	68	20	98	4	130	4	162	1		
15	1	41	17	69	16	99	5	131	6				
16	1	42	5	70	31	100	2	132	8				
18	7	43	2	71	10	101	2	133	5				
19	2	44	2	72	8	102	5	134	4				
20	4	45	3	73	12	103	8	135	4				
21	4	46	3	75	2	104	11	136	4				
22	20	47	1	76	1	105	4	138	2				
23	4	48	4	79	6	106	4	139	4				
24	4	49	3	81	8	108	2	140	2				
25	6	50	3	82	2	109	2	142	8				
26	14	51	3	84	2	110	2	143	2				
27	2	53	3	85	4	111	2	145	2				
28	4	56	3	86	8	114	2	146	6				
29	14	57	9	87	3	115	4	147	6				
30	12	58	4	88	6	117	2	149	6				
31	10	59	9	89	2	118	4	150	4				
32	2	60	8	90	4	120	8	151	6				
33	6	61	13	91	3	121	14	153	2				
34	10	62	15	92	2	122	16	154	2				
35	9	63	28	93	2	123	4	155	6				
36	22	64	21	94	4	124	2	156	2				

STAGE 1 WING 6 TGA IGNITION TEMPERATURE. 9 DEGREE C RISE/MINUTE

This sample size summary is applicable to figure 64

$F = +9.8310697E+01$ SIGNIFICANCE OF F = (+2.4085805E-08) * X)
 $R = +1.6027047E-01$ SIGNIFICANT
 $t = +9.9151751E+00$ SIGNIFICANT
 $N = 373$ SIGNIFICANT
 $N = 373$ DEGREES OF FREEDOM = 3729
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 5 DEGREES C/MIN

PARAMETER = ICLE BELOW T (G)
 UNIT OF MEASURE = IN/IN/DEG C
 $\times 10^{-4}$



STAGE 1, WING G, TP-H1011 THERMAL COEFFICIENT OF LINEAR EXPANSION BELOW TC

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	37	13	65	14	95	7	125	2	157	2		
10	1	38	4	66	21	96	4	126	2	158	4		
11	1	39	7	67	32	97	6	127	2	161	2		
13	1	40	5	68	20	98	4	130	4	162	1		
15	1	41	17	69	16	99	5	131	6				
16	1	42	5	70	31	100	2	132	8				
18	7	43	2	71	10	101	2	133	5				
19	2	44	2	72	8	102	5	134	4				
20	4	45	3	73	12	103	8	135	4				
21	4	46	3	75	2	104	11	136	4				
22	20	47	1	76	1	105	4	138	2				
23	4	48	4	79	6	106	4	139	4				
24	4	49	3	81	8	108	2	140	2				
25	6	50	3	82	2	109	2	142	8				
26	14	51	3	84	2	110	2	143	2				
27	2	53	3	85	4	111	2	145	2				
28	4	56	3	86	8	114	2	146	6				
29	14	57	9	87	3	115	4	147	6				
30	12	58	4	88	6	117	2	149	6				
31	10	59	9	89	2	118	4	150	4				
32	2	60	8	90	4	120	8	151	6				
33	6	61	13	91	3	121	14	153	2				
34	10	62	15	92	2	122	16	154	2				
35	9	63	28	93	2	123	4	155	6				
36	22	64	21	94	4	124	2	156	2				

STAGE 1 WING 6 TGA IGNITION TEMPERATURE. 9 DEGREE C RISE/MINUTE

This sample size summary is applicable to figure 64

$Y = ((+3.089673CE+02) + (+7.1302437E-02) * X)$
 $F = +7.1658550E+01$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +2.852530CE-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +8.4651373E+00$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 811$ DEGREES OF FREEDOM = 809
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

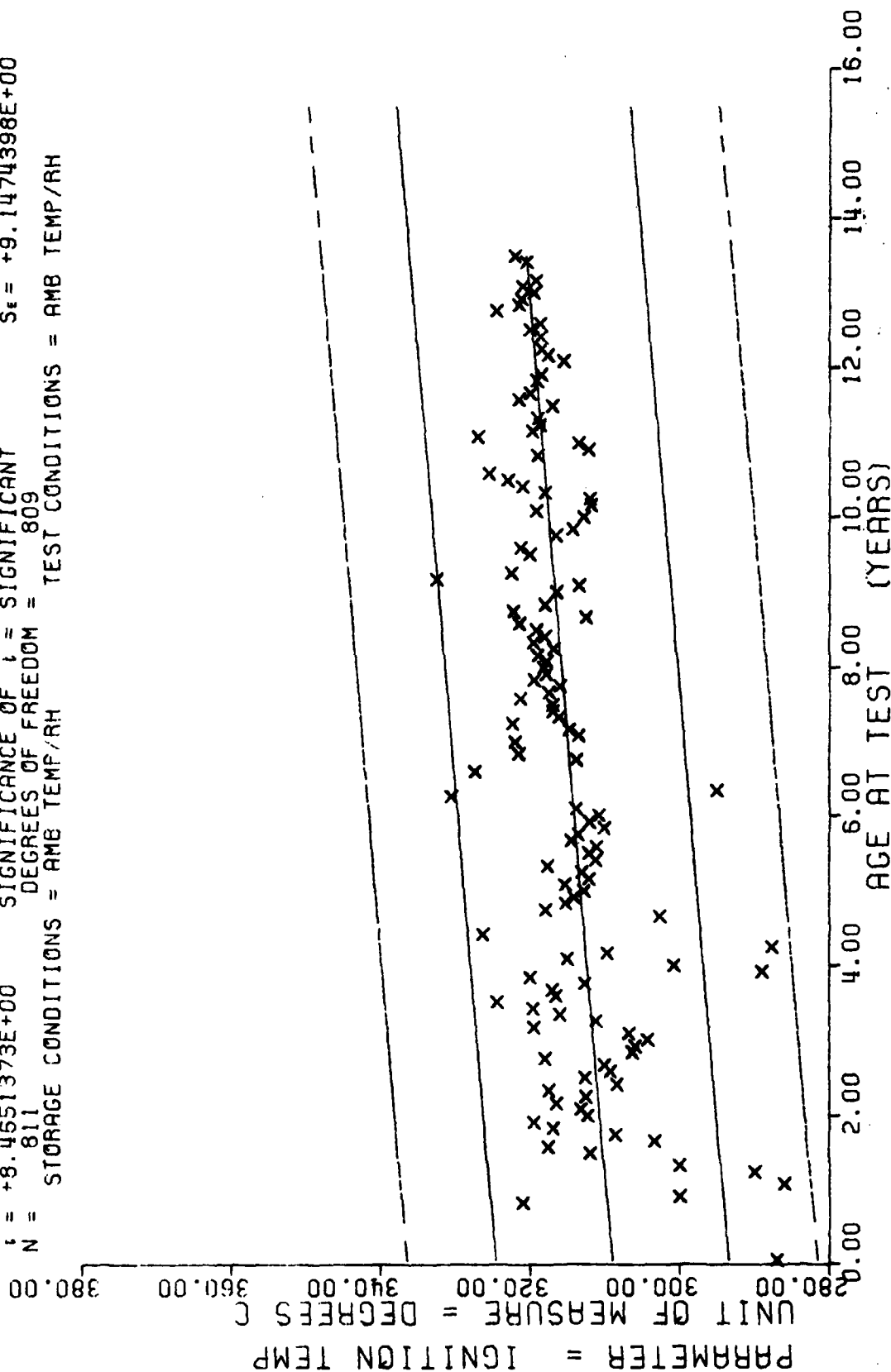


Figure 64

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NM SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
37	3	65	8	95	3	125	1	157	1
38	4	66	11	96	2	126	1	158	2
39	5	67	16	97	2	127	1	161	1
40	3	68	10	98	2	130	2		
41	15	69	8	99	2	131	3		
42	3	70	16	100	1	132	4		
43	2	71	6	101	1	133	3		
44	2	72	5	102	2	134	2		
45	1	73	6	103	3	135	2		
46	3	75	1	104	5	136	2		
47	1	76	1	105	2	138	1		
48	4	79	2	106	2	139	2		
49	3	81	4	108	1	140	1		
50	1	82	1	109	1	142	4		
51	3	84	1	110	1	143	1		
53	1	85	2	111	1	145	1		
56	2	86	4	114	1	146	3		
57	4	87	2	115	2	147	3		
58	3	88	3	117	1	149	3		
59	9	89	1	118	2	150	2		
60	7	90	2	120	4	151	3		
61	7	91	2	121	7	153	1		
62	8	92	1	122	8	154	1		
63	15	93	1	123	2	155	3		
64	10	94	2	124	1	156	1		

SAGE I WING 6 TGA X WT LOSS AT 250 DEG C HOLD, 12 DEG RISE/MIN TO HOLD

This sample size summary is applicable to figure 65

$Y = ((+2.0759267E+01) + (+2.5931791E-02) * X)$
 SIGNIFICANCE OF F = SIGNIFICANT
 SIGNIFICANCE OF R = SIGNIFICANT
 SIGNIFICANCE OF t = SIGNIFICANT
 DEGREES OF FREEDOM = 429
 STORAGE CONDITIONS = AMB TEMP/RH
 TEST CONDITIONS = 12 DEG R/M TOHLD

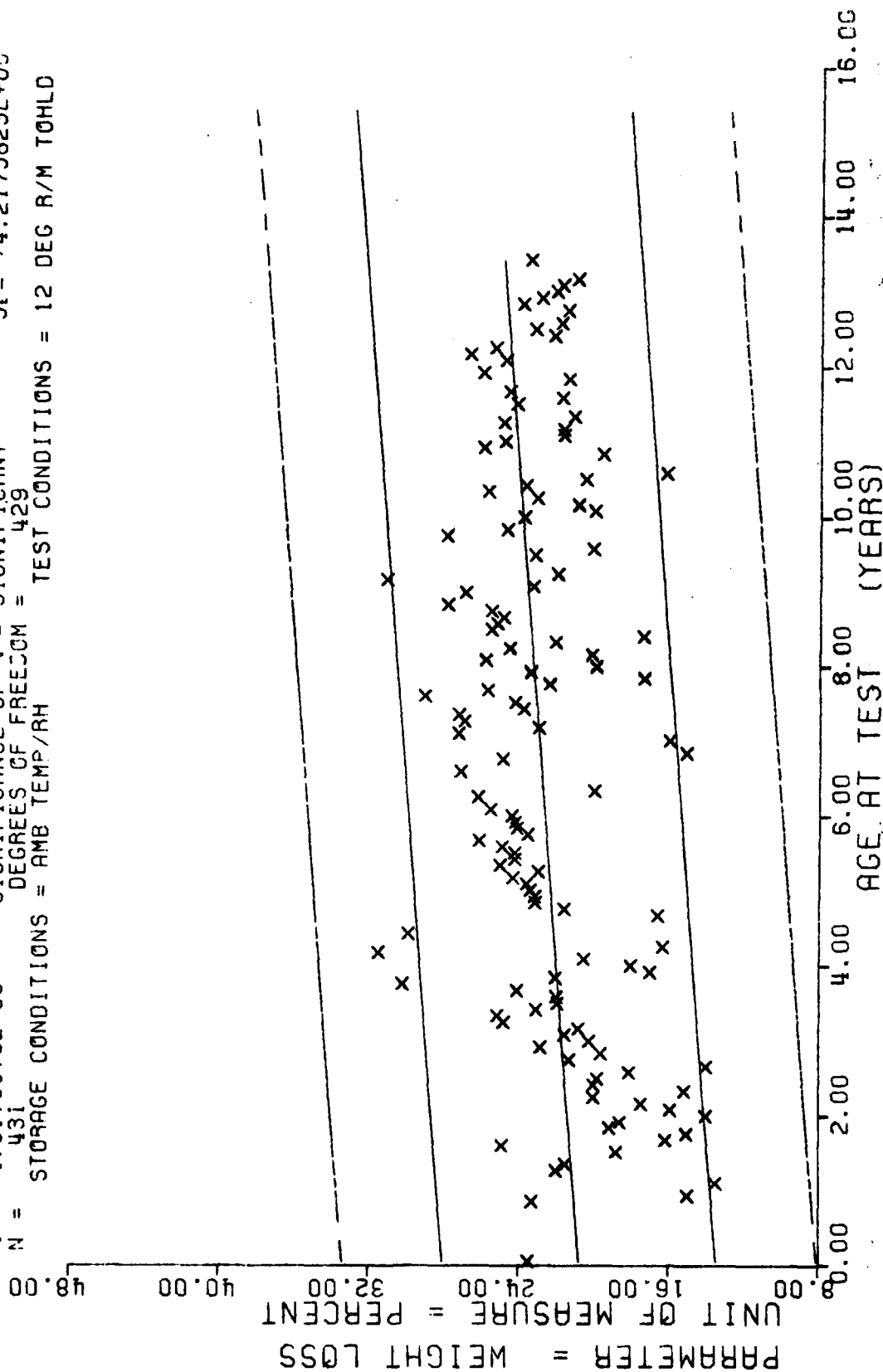


Figure 65

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	37	13	65	14	95	7	125	2
10	1	38	4	66	21	96	4	126	2
11	1	35	5	67	32	97	5	127	2
12	1	40	4	68	20	98	4	130	4
15	1	41	17	69	16	99	4	131	6
16	1	42	5	70	31	100	2	132	8
18	7	43	2	71	10	101	2	133	5
19	2	44	2	72	8	102	5	134	4
20	4	45	2	73	12	103	7	135	4
21	4	46	3	75	2	104	9	136	4
22	20	47	1	76	1	105	4	138	2
23	4	48	4	79	6	106	4	139	4
24	4	49	3	81	8	108	2	140	2
25	6	50	2	82	2	109	2	142	8
26	14	51	3	84	2	110	2	143	2
27	2	53	3	85	4	111	2	145	2
28	4	56	3	86	8	114	2	146	6
29	14	57	5	87	3	115	4	147	6
30	12	58	4	88	6	117	2	149	6
31	10	59	9	89	2	118	4	150	4
32	2	60	8	90	4	120	8	151	6
33	6	61	13	91	3	121	14	153	2
34	10	62	15	92	2	122	16	154	2
35	9	63	28	93	2	123	4	155	6
36	22	64	21	94	4	124	2	156	2

STAGE 1 WING 6 TGA PERCENT WEIGHT LOSS AT IGNITION, 9 DEG C RISE/MIN

This sample size summary is applicable to figure 66

$Y = ((+3.4711281E+01) + (+3.5630687E-02) * X)$
 $F = +4.3444149E+01$ SIGNIFICANCE OF F = SIGNIFICANT $G = +6.0017778E+00$
 $R = +2.2708847E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_0 = +5.4057823E-03$
 $t = +6.5912175E+00$ SIGNIFICANCE OF t = SIGNIFICANT $S_e = +5.8486327E+00$
 $N = 801$ DEGREES OF FREEDOM = 799
 STORAGE CONDITIONS = AMB TEMP/9H TEST CONDITIONS = 9 DEG C RISE/MIN

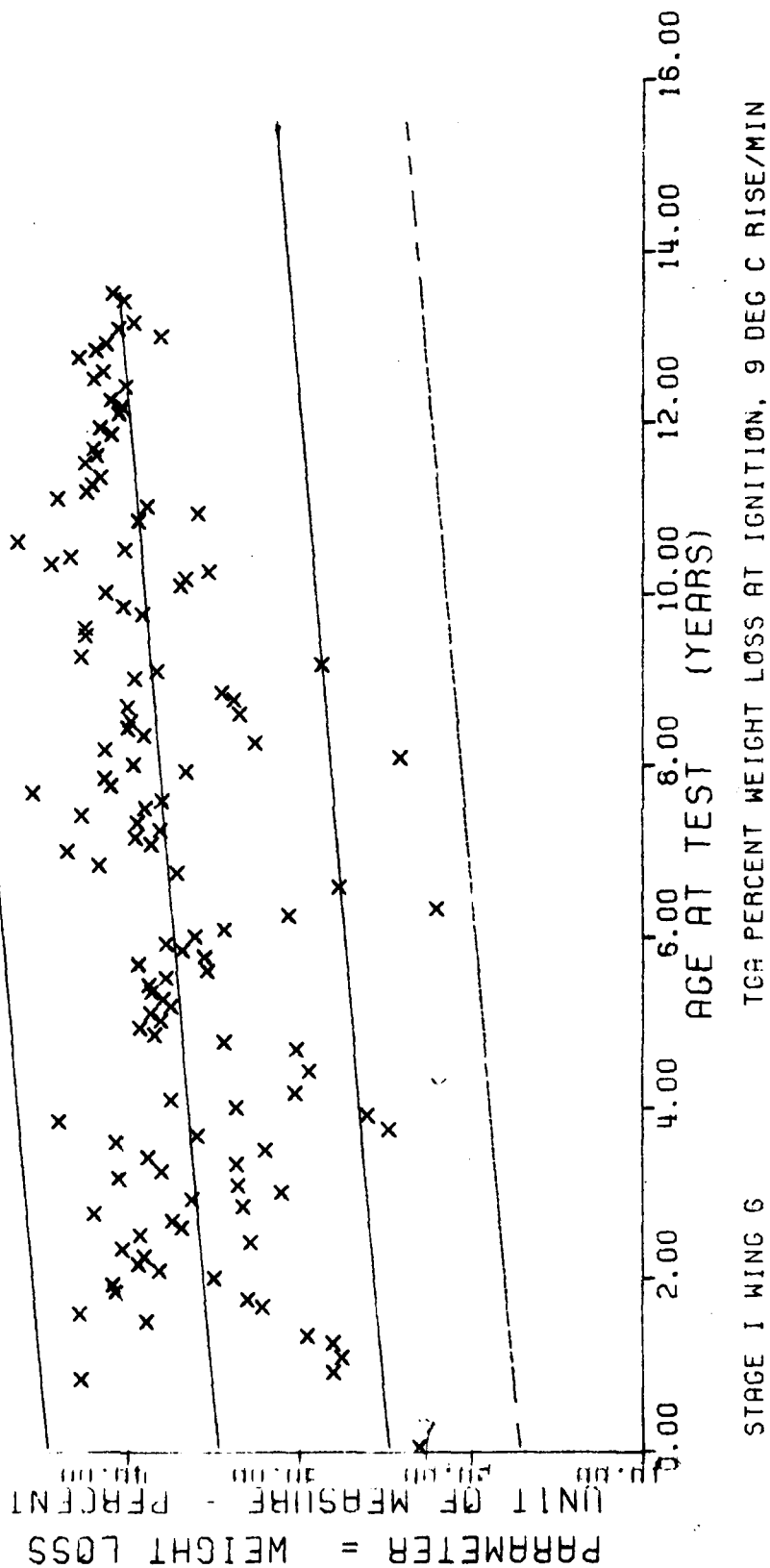


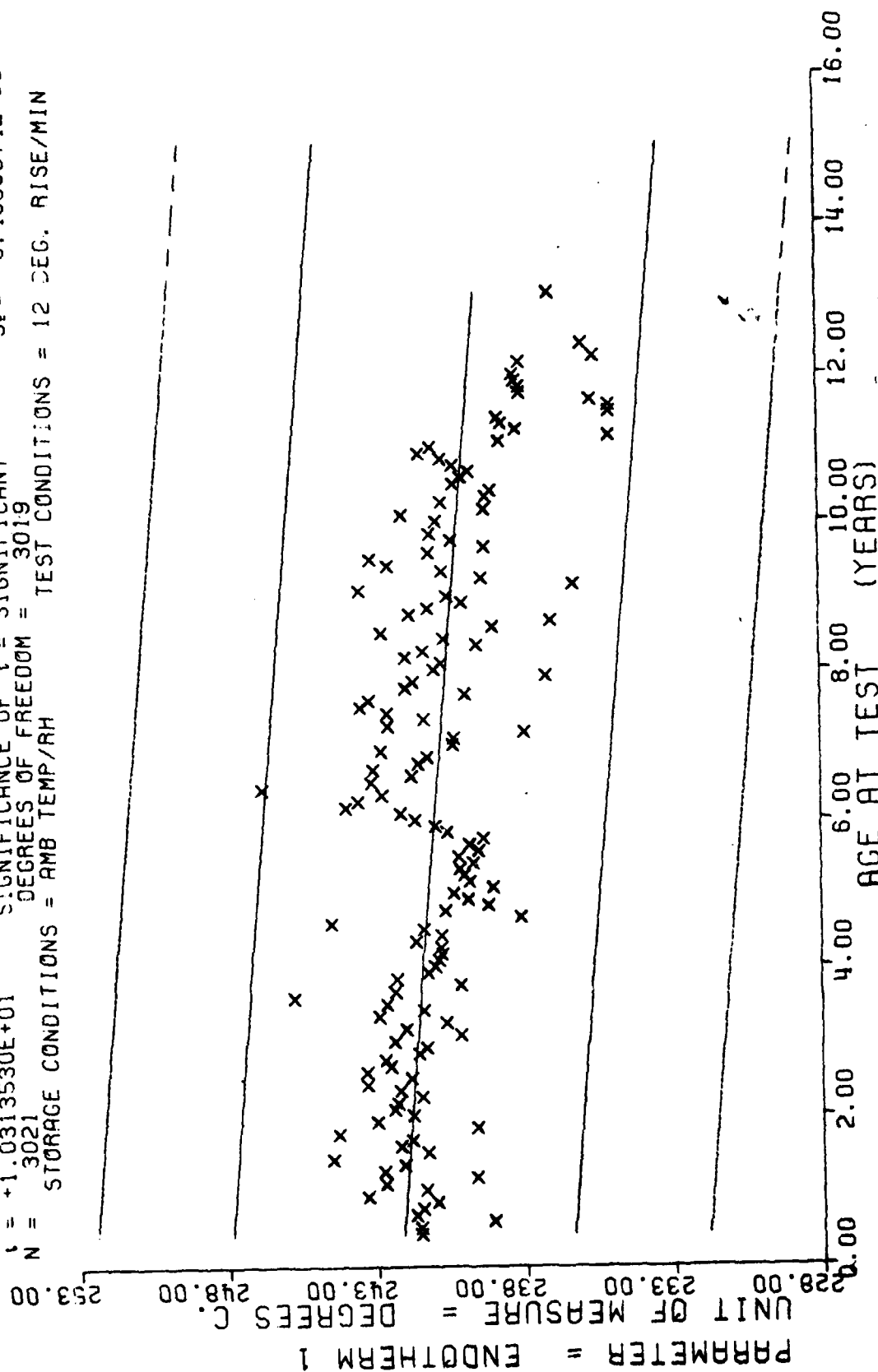
Figure 66

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
6	5	30	25	55	15	80	34	105	8
6	27	31	28	56	32	81	35	106	15
7	11	32	23	57	27	82	33	107	4
7	14	33	19	58	41	83	30	108	14
7	12	34	33	59	35	84	18	109	11
10	5	35	24	60	44	85	20	110	4
11	3	36	35	61	41	86	16	111	6
12	24	37	24	62	35	87	19	112	12
13	15	38	9	63	47	88	26	113	37
14	18	39	22	64	25	89	32	114	58
15	9	40	21	65	30	90	32	115	31
16	29	41	5	66	30	91	13	116	9
17	14	42	11	67	59	92	14	117	21
18	30	43	12	68	30	93	13	118	40
19	10	44	6	69	40	94	15	119	2
20	11	45	9	70	70	95	10	120	12
21	24	46	15	71	40	96	29	121	12
22	16	47	47	72	16	97	41	122	13
23	13	48	41	73	20	98	34	123	3
24	9	49	38	74	15	99	27	124	6
25	27	50	27	75	21	100	20	125	17
26	20	51	23	76	18	101	13	126	15
27	21	52	29	77	9	102	10	127	3
28	25	53	34	78	22	103	16	128	23
29	20	54	11	79	26	104	8	129	11

STAGE 1 WING 6, TP-H 1011, CTA, ENDOTHERM 1, 12 DEGREE CENTIGRADE RISE/MIN.

This sample size summary is applicable to figures 67 and 68

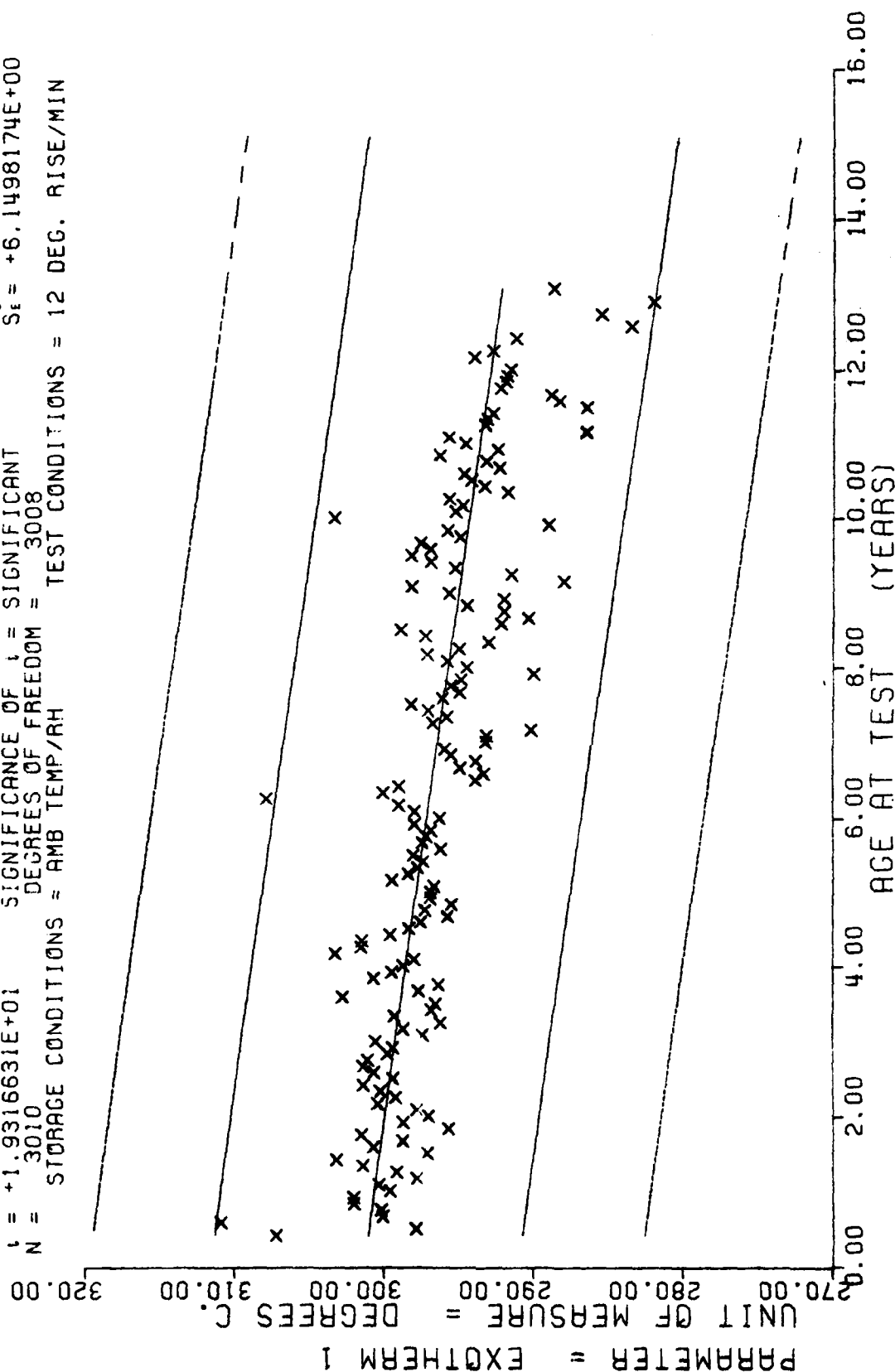
$Y = ((+2.4223314E+02) + (-1.7463968E-02) * X)$
 F = +1.0636890E+02 SIGNIFICANCE OF F = SIGNIFICANT $G_r = -3.4949266E+00$
 R = -1.8448314E-01 SIGNIFICANCE OF R = SIGNIFICANT $S_a = -1.6933066E-03$
 t = +1.0313530E+01 SIGNIFICANCE OF t = SIGNIFICANT $S_e = -3.4355074E+00$
 N = 3021 DEGREES OF FREEDOM = 3019
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 12 DEG. RISE/MIN



STAGE 1 WING 6, TP-H 1011, DTA, ENDOTHERM 1, 12 DEGREE CENTIGRADE RISE/MIN

Figure 67

$Y = ((+3.0133495E+02) + (-5.8572155E-02) * X)$
 $F = +3.7513225E+02$ SIGNIFICANCE OF F = SIGNIFICANT $S_e = +6.5190183E+00$
 $R = -3.3220052E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_e = +3.0322137E-03$
 $t = +1.9316631E+01$ SIGNIFICANCE OF t = SIGNIFICANT $S_e = +6.1498174E+00$
 $N = 3010$ DEGREES OF FREEDOM = 3008
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 12 DEG. RISE/MIN



STAGE 1 WING 6, TP-H 1011, DTA, EXOTHERM 1, 12 DEGREE CENTIGRADE RISE/MIN

Figure 68

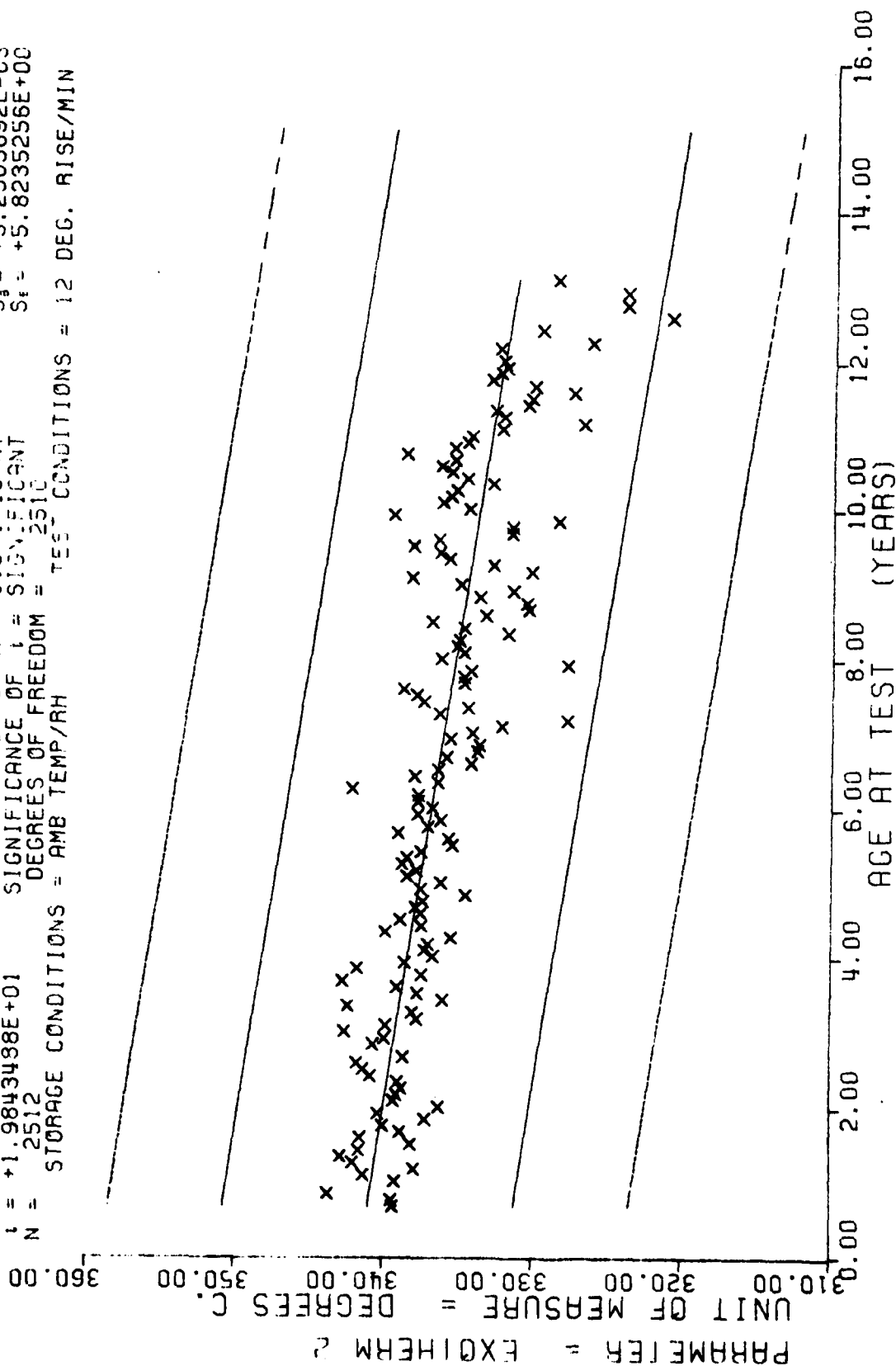
*** SAMPLE SIZE SUMMARY ***

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
0	3	34	29	59	16	109	11	134	5
1	5	35	42	60	16	110	4	135	7
10	3	36	34	61	15	111	6	136	6
12	17	37	28	62	17	112	9	137	7
13	10	38	30	63	15	113	35	138	6
14	9	39	10	64	32	114	57	139	6
15	5	40	22	65	31	115	28	140	8
16	22	41	24	66	13	116	7	141	7
17	14	42	48	67	13	117	20	142	15
18	18	43	20	68	12	118	40	143	35
19	4	44	29	69	14	119	2	144	12
20	11	45	56	70	9	120	9	145	8
21	22	46	47	71	26	121	12	146	3
22	13	47	15	72	33	122	13	147	10
23	10	48	16	73	32	123	3	148	2
24	9	49	14	74	25	124	8	149	2
25	20	50	17	75	16	125	17	150	2
26	16	51	10	76	12	126	14	151	3
27	12	52	9	77	10	127	3	152	2
28	19	53	21	78	17	128	19	153	2
29	18	54	26	79	7	129	10	154	2
30	22	55	34	80	7	130	46	155	3
31	21	56	35	81	15	131	37	156	
32	22	57	30	82	2	132	22	157	
33	11	58	20	83	12	133	14		

STAGE 1 WING 6. TP-H 1011. DTA. EXOTHERM 2. 12 DEGREE CENTIGRADE RISE/MIN

This sample size summary is applicable to figure 69

$F = +3.997303E+02$) + ($-5.4502633E-02$) * X)
 SIGNIFICANCE OF F = SIGNIFICANT
 $R = -3.6824542E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +1.9843488E+01$ SIGNIFICANCE OF t = SIGNIFICANT
 N = 2512 DEGREES OF FREEDOM = 2510
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 12 DEG. RISE/MIN



STAGE 1 WING 6. TP-H 1011. DTA, EXOTHERM 2, 12 DEGREE CENTIGRADE RISE/MIN

Figure 69

*** SAMPLE SIZE SUMMARY ***

AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
3	3	36	4	64	4	70	6
4	7	37	5	65	7	77	4
11	3	38	2	66	4	78	1
12	4	39	5	67	9	79	1
13	5	40	3	68	4	80	1
14	3	41	2	69	7	81	1
15	1	42	1	70	5	82	3
16	4	43	5	71	2	83	4
17	5	44	7	72	1	84	9
18	5	45	8	73	5	85	4
19	2	46	2	74	10	86	2
20	4	47	2	75	12	87	2
21	2	48	3	76	8	88	1
22	1	49	2	77	2	89	2
23	1	50	2	78	5	90	4
24	1	51	1	79	2	91	1
25	1	52	3	80	10	92	6
26	2	53	4	81	12	93	2
27	3	54	1	82	10	94	2
28	4	55	1	83	8		
29	3	56	3	84	7		
30	5	57	7	85	1		
31	9	58	5	86	8		
32	4	59	7	87	8		
33	4	60	4	88	10		
34	5	61	7	89	12		
35	4	62	6	90	10		
		63	5	91	8		
				92	2		
				93	2		
				94	2		

STAGE 1 WING 6, TP-H 1011, CTA, EXOTIC 3, 12 DEGREE CENTIGRADE RISE/MIN

This sample size summary is applicable to figure 77

PARAMETER = EXOTHERM 3
UNIT OF MEASURE = DEGREES C.
400.00 340.00 360.00 380.00 420.00

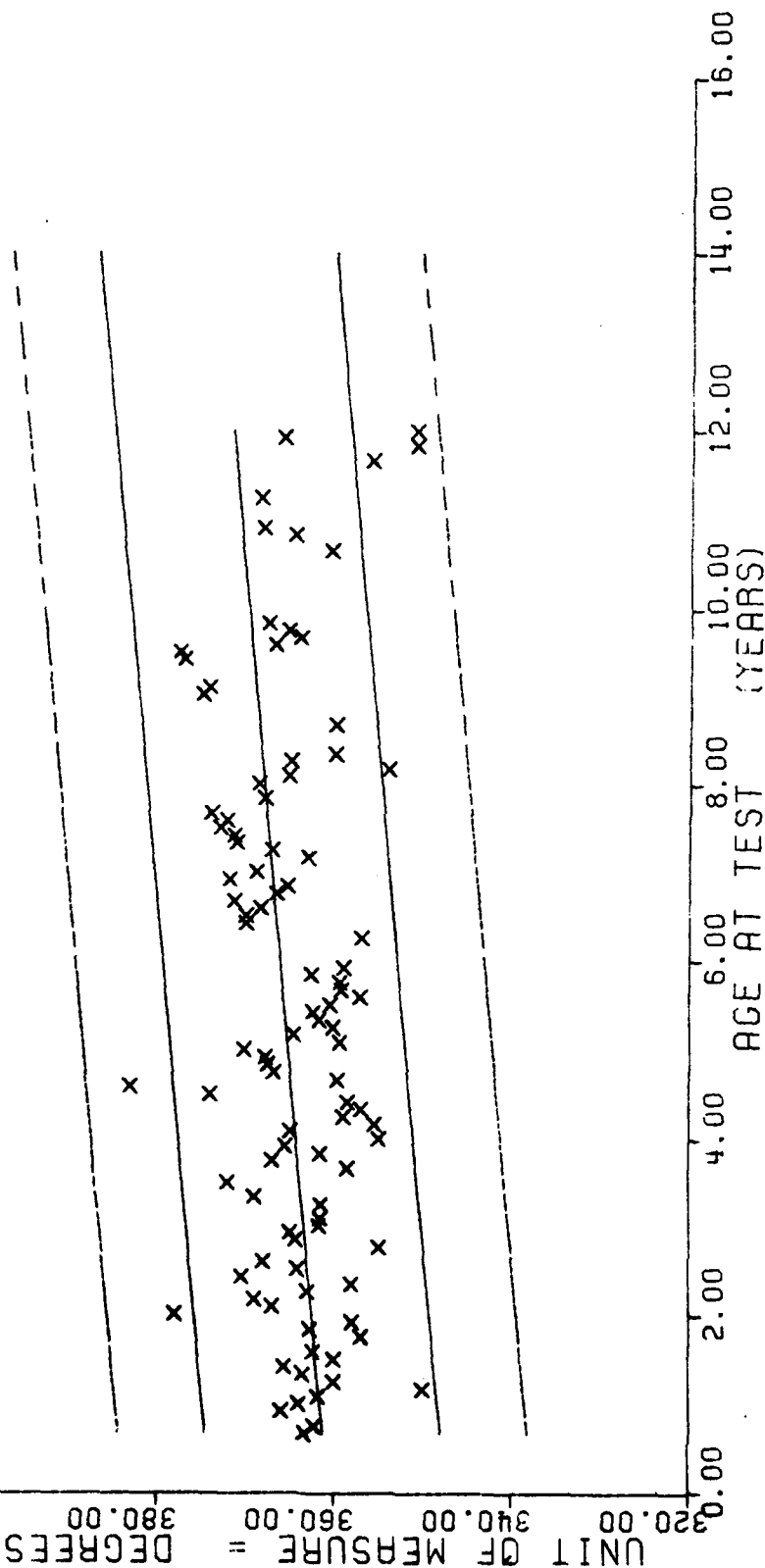


Figure 70

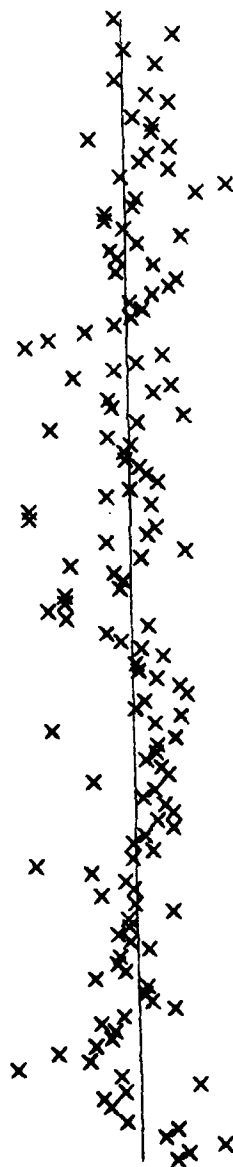
AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
3	1	31	25	50	29	106	12	151	33
9	27	32	23	57	20	107	4	152	24
7	11	33	15	53	30	108	11	153	10
3	11	34	28	59	20	109	7	154	6
3	5	35	21	50	39	110	3	155	5
10	3	36	28	51	35	111	6	156	8
12	20	37	18	52	27	112	10	157	6
13	10	38	3	53	42	113	29	158	6
14	17	39	20	54	20	114	37	159	6
15	7	40	16	55	23	115	26	160	5
16	23	41	5	56	20	116	8	161	4
17	10	42	8	57	48	117	19	162	14
18	25	43	11	58	20	118	37	163	38
19	0	44	5	59	34	119	2	164	14
20	2	45	7	70	57	120	12	165	8
21	12	46	10	71	45	121	12	167	4
22	7	47	40	72	18	122	13	169	10
23	12	48	31	73	20	123	3	151	2
24	8	49	35	74	15	124	8	153	2
25	26	50	23	75	20	125	17	155	2
26	18	51	23	76	18	126	15	157	3
27	18	52	28	77	3	127	3		
28	22	53	31	78	19	128	21		
29	15	54	11	79	9	129	11		
30	20	55	15	80	25	130	54		

STAGE 1 WING 6. TF-H 1J11. DTA. IGNITION TEMPERATURE. 12 DEGREE CENT. RISE/MIN

This sample size summary is applicable to figure 71

$Y = ((-3.6994003E+02) + (+8.13E+183E-03)) * X$
 SIGNIFICANCE OF F = NOT SIGNIFICANT
 SIGNIFICANCE OF R = NOT SIGNIFICANT
 SIGNIFICANCE OF t = NOT SIGNIFICANT
 DEGREES OF FREEDOM = 2535
 STORAGE CONDITIONS = AMB TEMP/RH
 TEST CONDITIONS = 12 DEG. RISE/MIN

PARAMETER = IGNITION TEMPERATURE
 UNIT OF MEASURE = DEGREES C.
 320.00 340.00 360.00 380.00 400.00 420.00



STAGE 1 WING 6, TP-H 1011, DTA, IGNITION TEMPERATURE. 12 DEGREE CENT. RISE/MIN

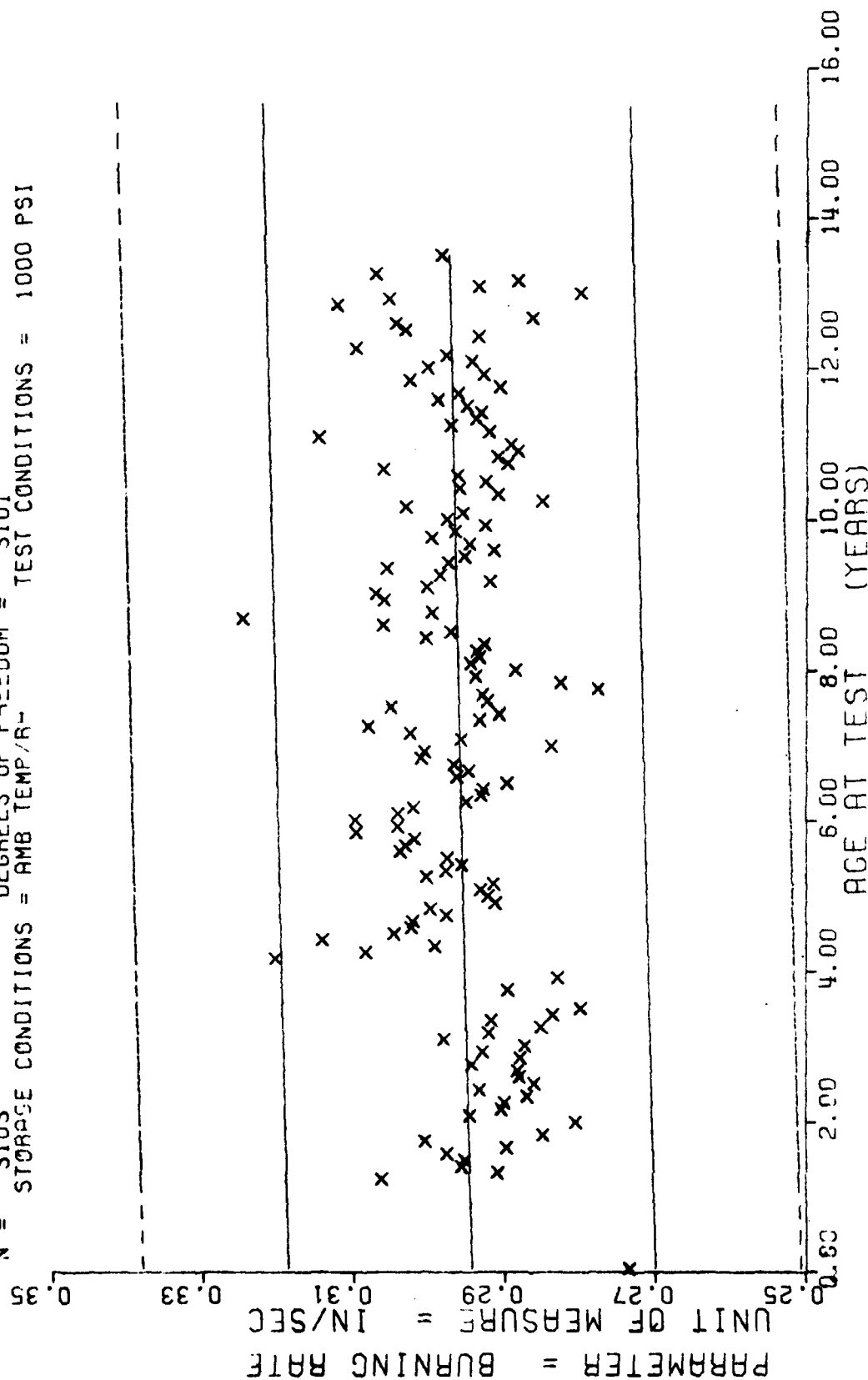
Figure 71

NO.	IN.	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
1	2	40	33	70	27	30	20	121	27	146	36
10	3	41	6	71	22	36	24	122	21	147	12
10	3	42	15	72	54	37	24	123	9	149	9
17	15	45	5	73	47	38	35	124	5	150	9
10	12	47	9	74	71	39	35	125	6	151	9
10	12	50	12	75	57	100	22	126	12	152	6
10	10	51	12	76	30	101	5	127	22	154	6
11	3	52	22	77	21	102	18	128	12	155	3
12	3	53	24	78	8	103	6	129	39	156	3
20	3	54	20	79	39	104	9	130	54	157	3
20	3	55	24	80	10	105	3	131	86	158	6
20	0	56	17	81	34	107	6	132	24	159	3
27	24	57	27	82	24	108	6	133	17	162	2
25	27	58	45	83	10	109	5	134	15		
19	46	59	42	84	9	110	3	135	24		
30	18	60	44	85	18	111	15	136	15		
31	42	61	33	86	12	112	14	137	9		
32	31	62	67	87	0	113	18	138	9		
33	43	63	51	88	15	114	54	139	50		
34	29	64	50	89	16	115	55	140	24		
35	43	65	37	90	28	116	22	141	27		
36	50	66	15	91	19	117	24	142	18		
37	24	67	24	92	26	118	28	143	12		
38	19	68	30	93	9	119	27	144	30		
39	21	69	24	94	6	120	79	145	27		

STAGE I WING 6 TP-H1011 BURNING RATE AT 1000 PSI

This sample size summary is applicable to figure 72

$Y = ((+2.9438152E-01) + (+1.9093413E-05) * X)$
 $F = +7.5178904E+00$ SIGNIFICANCE OF F = SIGNIFICANT $\sigma_1 = +1.4580225E-02$
 $R = +4.9173050E-02$ SIGNIFICANCE OF R = SIGNIFICANT $S_a = +6.9636284E-06$
 $t = +2.7418771E+00$ SIGNIFICANCE OF t = SIGNIFICANT $S_t = +1.4564931E-02$
 $N = 3103$ DEGREES OF FREEDOM = 3101
 STORAGE CONDITIONS = AMB TEMP/R- TEST CONDITIONS = 1000 PSI



STAGE I WING 6 TP-H1011 BURNING RATE AT 1000 PSI

Figure 72

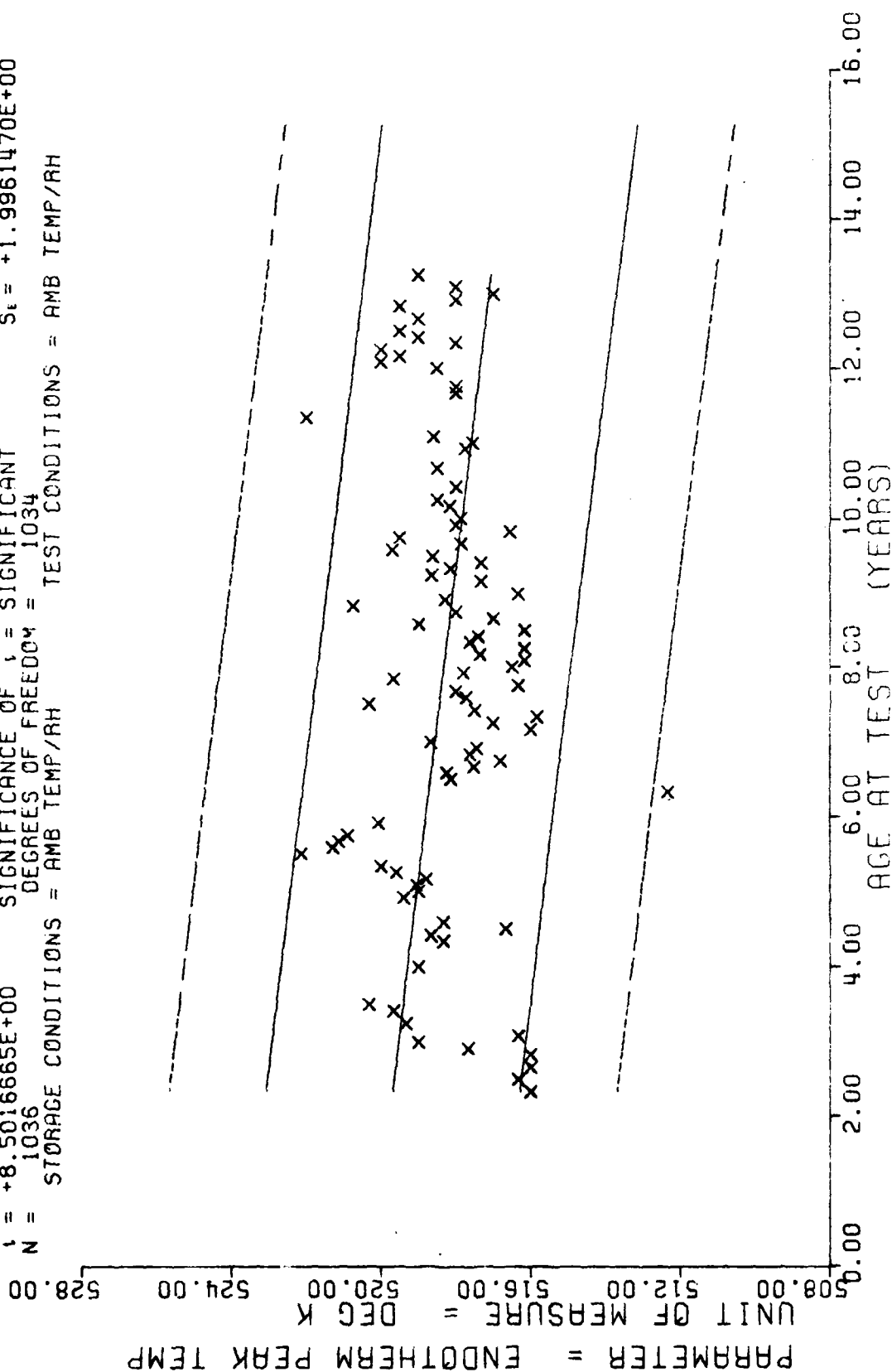
*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
28	6	71	15	101	5
30	3	75	3	102	2
32	2	76	3	103	2
34	2	76	30	104	2
35	5	75	42	105	2
36	7	80	50	106	2
37	3	81	42	107	2
39	6	82	32	108	2
41	3	83	50	110	2
42	3	84	3	111	2
46	3	86	5	112	2
52	3	87	2	113	2
53	3	88	6	114	2
54	3	89	2	115	2
55	3	90	3	116	5
59	10	91	15	117	2
60	18	92	5	118	2
61	21	93	6	119	2
62	15	94	3	120	8
63	5	95	5	122	6
64	3	96	12	123	2
66	14	97	6	125	2
67	54	98	14	128	2
68	78	99	18	131	8
69	36	100	8	132	54

STAGE 1 RING 6 DIFFERENTIAL SCANNING CALORIMETER ENDOTHERM PEAK TEMP

This sample size summary is applicable to figures 73, 74, and 75

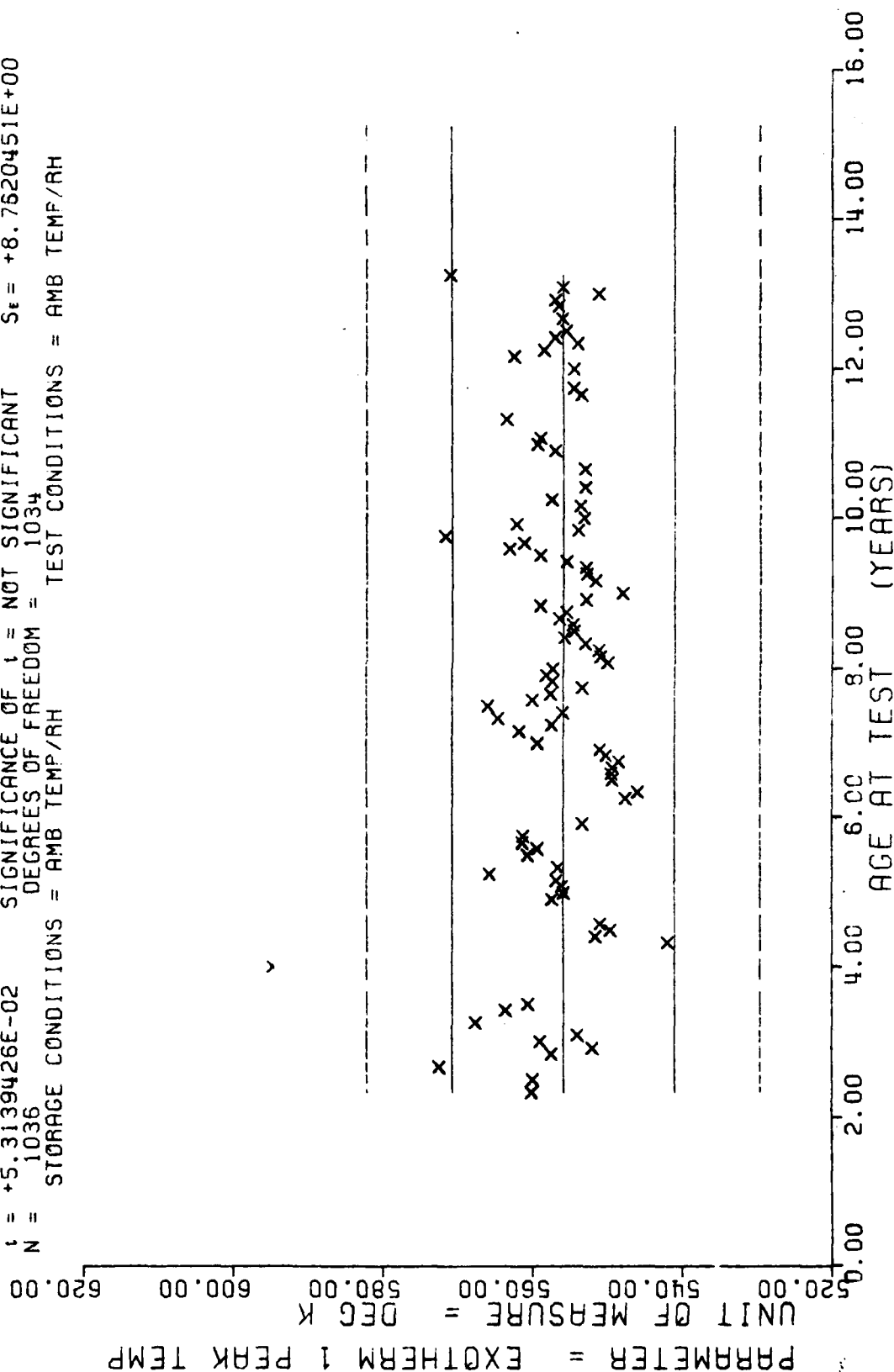
$F = +7.2278334E+01$ SIGNIFICANCE OF $F =$ SIGNIFICANT $G_1 = +2.0637380E+00$
 $R = -2.5560648E-01$ SIGNIFICANCE OF $R =$ SIGNIFICANT $S_0 = +2.3728781E-03$
 $t = +8.5016665E+00$ SIGNIFICANCE OF $t =$ SIGNIFICANT $S_1 = +1.9961470E+00$
 $N = 1036$ DEGREES OF FREEDOM = 1034
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER ENDOTHERM PEAK TEMP

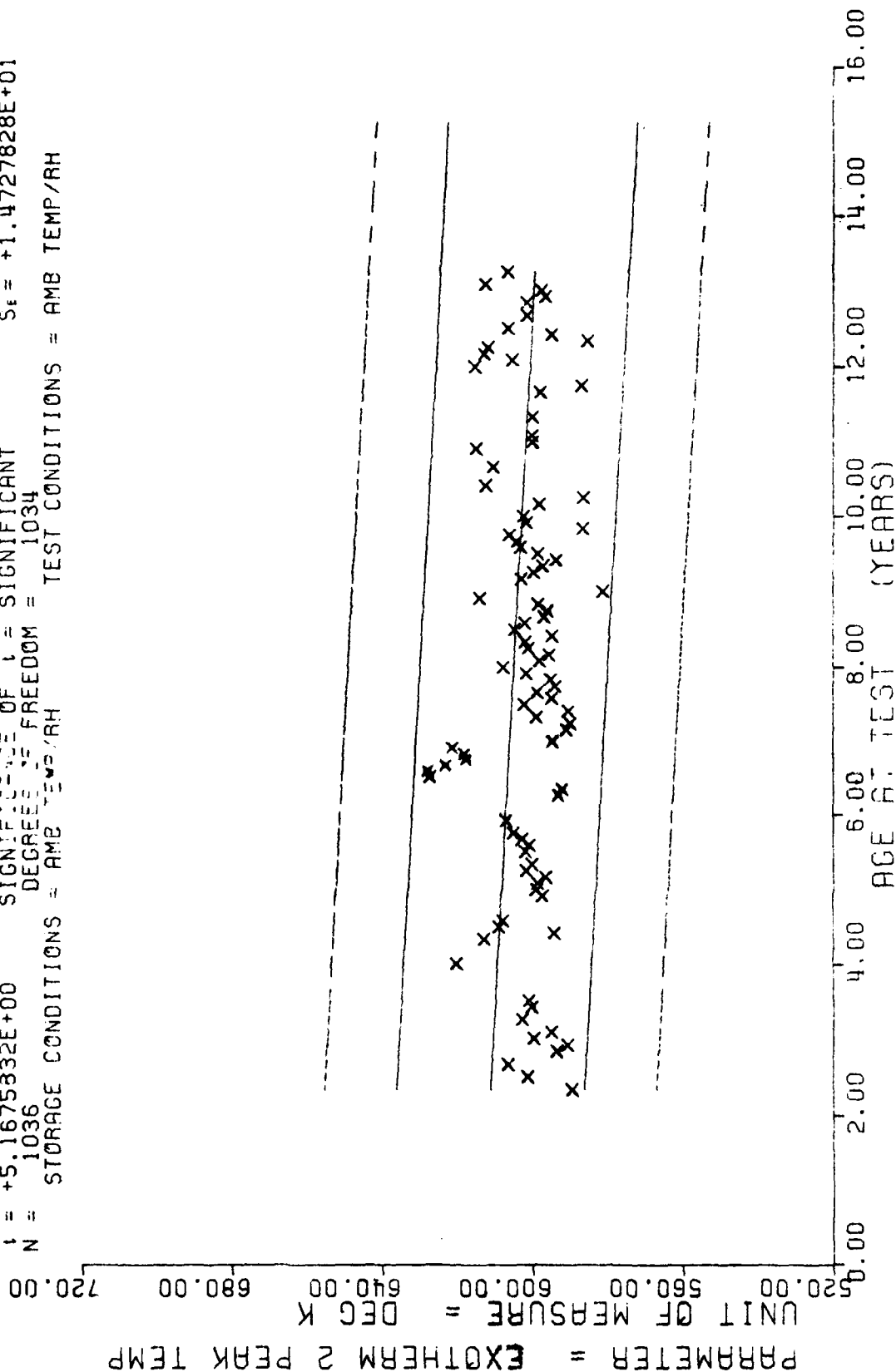
Figure 73

Y = ((+5.5584711E+02) + (+5.5348422E-04) * X)
 F = +2.8237985E-03 SIGNIFICANCE OF F = NOT SIGNIFICANT $G_t = +8.7578232E+00$
 R = +1.6525552E-03 SIGNIFICANCE OF R = NOT SIGNIFICANT $S_a = +1.0415698E-02$
 t = +5.3139426E-02 SIGNIFICANCE OF t = NOT SIGNIFICANT $S_e = +8.7620451E+00$
 N = 1036 DEGREES OF FREEDOM = 1034
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER EXOTHERM 1 PEAK TEMP

$Y = ((+6.137027E+02) + (-9.0470940E-02) * X)$
 $F = +2.6703916E+01$ SIGNIFICANCE OF F = SIGNIFICANT $\sigma_t = +1.4909587E+01$
 $R = -1.5866838E-01$ SIGNIFICANCE OF R = SIGNIFICANT $S_d = +1.7507398E-02$
 $t = +5.1675832E+00$ SIGNIFICANCE OF t = SIGNIFICANT $S_e = +1.4727828E+01$
 $N = 1036$ DEGREES OF FREEDOM = 1034
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER EXOTHERM 2 PEAK TEMP

Figure 7b

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4. TITLE (and Subtitle) Propellant Surveillance Report LGM-30 F & G Stage I, Phase E Series VII, TP-H1011		5. TYPE OF REPORT & PERIOD COVERED Test Results - Semi Annual
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) John A. Thompson		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Propellant Lab Section Directorate of Maintenance OO-ALC Hill AFB, Utah 84056		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS MMWRM Project M82934C- WNL17514
11. CONTROLLING OFFICE NAME AND ADDRESS Service Engineering Division Directorate of Materiel Management OO-ALC Hill AFB, Utah 84056		12. REPORT DATE October 1979
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Solid Propellant Minuteman		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30 F & G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRM Project M82934C-WNL17514. The data from this test period are combined with data from previous testing and entered into the G085 computer for storage, analysis and regression analysis. From the statistical analysis of all data tested to date (thirteen and one-half		

years for F & G), significant degradation of the propellant does not appear likely for at least two years past the oldest data point.

Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point is indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 system.